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the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has also become an important employer of women, with 5.5 million women employed in the public sector in 1995, compared with 4.5 million in 1980. The public sector has also become an important employer of people with disabilities, with 1.5 million people with disabilities employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are over 50 years of age. In 1995, 1.5 million people over 50 years of age were employed in the public sector, compared with 1 million in 1980. The public sector has also become an important employer of people who are under 25 years of age. In 1995, 1.5 million people under 25 years of age were employed in the public sector, compared with 1 million in 1980.

The public sector has also become an important employer of people who are from ethnic minority backgrounds. In 1995, 1.5 million people from ethnic minority backgrounds were employed in the public sector, compared with 1 million in 1980. The public sector has also become an important employer of people who are from disadvantaged backgrounds. In 1995, 1.5 million people from disadvantaged backgrounds were employed in the public sector, compared with 1 million in 1980.

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back

ANNUAL REPORT

OF THE

Summary Statistics,

SUPERINTENDENT

App 1-6.

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1889

Printed by order of the Water Committee.



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OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

Compliments of

B. D. McCa

Superintendent Montreal Water

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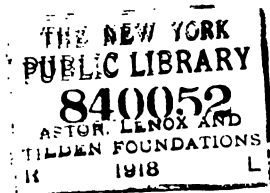
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ANNUAL REPORT
OF THE
SUPERINTENDENT of the MONTREAL WATER WORKS
FOR THE
YEAR ENDING 31st DECEMBER 1889.

To the

Mayor, Aldermen and Citizens of the City of Montreal.

GENTLEMEN,

I have the honor to report on the operations of the Montreal Water Works Department for the year 1889. The report is divided into the following heads. viz: 1st. Aqueduct.—2nd. Low Level Pumping Works.—3rd. Work Shop at Wheel House and Brass Foundry.—4th. Tail Race.—5th. Pipe Track and Pumping Mains.—6th. Reservoirs. — 7th. High Level Service.— 8th. Pipe Laying.—9th. Maintenance of Distribution and Service Pipes.— 10th. Consumption of Water.—11th. Meters and House to House Inspection.—12th. Administration. — 13th. General Remarks. — 14th. Appendix.

1st AQUEDUCT.

The line and berm ditches, where most requiring it, were cleaned and the Aqueduct banks, where low, were raised and strengthened. Ordinary repairs were done to line fences and fences on bridge approaches. One bridge, that on the Greenshield farm, was rebuilt. Four others were straightened up and repaired. Also some trifling repairs to the crib work abutments of some of the farm bridges. The Guardian's dwelling was repaired and painted.

The high spoil bank on the right bank, near the entrance of the Aqueduct, as well as that near the Junction, are being partly washed into the Aqueduct every spring and every heavy rain storm. This will go on, unless money is granted to cut down these spoil banks, grade the tops, with a fall to the back and put

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some soil on the front slope and seed it down so as to form a sod. The stuff washing in must obstruct the Aqueduct more or less, and to prevent its going in will cost less than to take it out again.

The retaining walls along the banks are generally in good condition, though some repairs are needed at certain points.

The power furnished by the Aqueduct during the year, has been about an average of what it has given since the opening of the new entrance and the placing of the last turbine wheel at the pump house.

The pier of the stone bridge carrying the Pavillion road over the Aqueduct offers, in winter a serious obstruction to the flow of water, affording a nucleus around which ice forms to a much greater thickness than in other parts of the Aqueduct. I have reported on this matter to the Water Committee recommending the removal of the pier and conversion of the bridge into a single span girder.

2nd. LOW LEVEL PUMPING WORKS.

The repairs to the water power machinery have been light. Wheels Nos. 1, 3 and 4 are in fair condition. No. 2 is, as reported a year ago, very much the worse for wear. The pumps of Nos. 2 and 3 are worn out.

Steam Engine No. 1 is in good condition and has worked satisfactorily when required during the year. This engine was accepted by the Water Committee on 10th September 1889 and the final payment on the contract with Messrs. Henry R. Worthington was made on 31st December. The contract price was \$51,650.00.

Steam Engine No. 2 "the Gilbert" is not kept in working order, being considered, at best, unreliable, in fact not to be reckoned with the available pumping power.

Steam Engine No. 3. This engine requires to be taken apart and examined pretty closely and repaired, before it can be said to be in an efficient condition, though it may be set to work at any time.

The Wheel House foundations are in want of repair. It may be found that pointing the joints of the masonry will be sufficient, at all events not much more can be done without too long an interruption of the pumping. The walls outside, above ground, require pointing.

The Engine House with the exception of one corner of the new extension, which shows some signs of settling, is in good order.

The floors of the Boiler House of the 2nd and 3rd batteries, are very dilapidated and should be torn out and remade in concrete.

The Coal Shed is in fairly good condition. Some of the posts supporting the beams have settled a little and require re-adjusting.

The boilers are in good order. The Leadbeater bars and blast

were applied to two of the Heine boilers enabling steam to be kept up with a cheap quality of coal.

Four of the dwellings have privies instead of water closets, and at times in summer the stench from these is very offensive on the other side of the dwellings and scarcely a hundred yards off is the River St. Pierre carrying with its waters, offal, in various stages of putrefaction, and giving off most disgusting odours. The whole arrangement is diametrically opposed to hygienics. These facts have been reported to the Water Committee.

For all detail concerning these works I beg to refer to the report of the Chief Engineer of the low level pumping works, page 9. of appendix.

The total quantity of water pumped by water power during the year is 3,482,880,000 gallons with an expenditure of \$5674 $\frac{1}{100}$ making \$1.62 $\frac{1}{100}$ per million gallons raised 169 feet, or \$0.00 $\frac{9}{100}$ per foot high.

The total quantity pumped by steam power during the year is 1,211,347,800 the expenditure for which is \$15,960 $\frac{1}{100}$ equal to \$13 17 $\frac{1}{100}$ per million gallons raised 169 feet or \$0.07 $\frac{1}{100}$ per foot high.

Schedule No. 5, in appendix, shows the work done by the different pumping engines at the low level pumping works.

The following table shows the cost of raising one million gallons one foot high, by water power and by steam power, for the last fifteen years and the average cost, by each method, for the same period.

YEAR.	BY WATER.	BY STEAM.
1875.....	\$0.0200.....	\$0.119
1876.....	0.0140.....	0.144
1877.....	0.0158.....	0.080
1878.....	0.0106.....	0.170
1879.....	0.0093.....	0.119
1880.....	0.0120.....	0.123
1881.....	0.0136.....	0.121
1882.....	0.0118.....	0.258
1883.....	0.0135.....	0.134
1884.....	0.0124.....	0.211
1885.....	0.0102.....	0.094
1886.....	0.0110.....	0.138
1887.....	0.0092.....	0.117
1888.....	0.0112.....	0.082
1889.....	0.0096.....	0.078
Average of 15 years.....	0.0123.....	0.132

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3rd. WORK SHOP AT WHEEL HOUSE AND BRASS FOUNDRY.

These are in good order, requiring little or no repairs. The work shop should have another lathe. Work which could be done in this shop, much more economically than elsewhere, has to be sent out. Probably as much money has been spent in this way, since the lathe was asked for, as would pay for it.

The following is a list of new work turned out from the shop.

50	4" valves complete planed and bored including brases.	} Sent to McDou- gall to be fitted.
102	6" valves complete planed and bored including brases.	
100	New Hydrants.	
16	New 4" valves.	
36	do 6" "	
5	do 8" "	
19	do 10" "	
44	do 12" "	
1	do 4" valve spindle.	
1	do 6" " "	
120	$\frac{5}{8}$ " stop cocks old kind.	
119	$\frac{5}{8}$ " pneumatic stop valves.	
3126	$\frac{1}{2}$ " " " "	
8	1" " " "	
5	$1\frac{1}{2}$ " stop cocks for iron pipe.	
700	$\frac{1}{2}$ " 2 way branches.	
243	$\frac{1}{2}$ " 3 " "	
195	$\frac{1}{2}$ " 4 " "	
176	$\frac{1}{2}$ x $\frac{1}{2}$ " reducing couplings.	
187	$\frac{1}{2}$ " Nozles.	
1495	" "	
4	1" "	
50	3" Hydr. watering nozles.	
12	Spare 6" hydrant bottoms.	
303	Service rods.	
53	$\frac{1}{2}$ " steel nozle drills.	
58	$\frac{1}{2}$ " " " "	
24	$\frac{1}{2}$ " couplings.	
30	" "	
12	Hydr. leather rings.	
542	Nipples.	
3760	Round ends.	
3800	Sqr. ends.	
7208	Pointed ends.	
7745	Union couplings.	

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7284	Tube caps.	
86	$\frac{3}{4}$ " bolts and nuts.	} Pipe laying.
24	$\frac{3}{4}$ " eye bolts and nuts.	
4	1 $\frac{1}{8}$ " bolts and nuts	
24	" " "	} Bridges L. of Aqueduct.
12	Sqrs 1 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ " 105 lbs.	
4	1 $\frac{1}{4}$ " bolts and nuts 46 lbs.	
6	$\frac{7}{8}$ " studs 2 $\frac{1}{2}$ " long.	} High L. Eng.
121	Suction valve springs.	
20	Brass valves 44 lbs.	
28	Water meter pistons.	
1	Hydrant valve and seat (extra).	
21	do brass sockets	"
2	New plungers for feed pump eng. No. 3 fitted.	
164	$\frac{1}{4}$ " Iron pins for fences.	
34	$\frac{3}{8}$ " bolts and nuts.	} Coffor dam river St. Pierre.
6	1" " "	
32	Chaldrons of coke.	

REPAIRS DONE IN MACHINE SHOP.

6	$\frac{5}{8}$ " union meters.
1	1" " "
1	12" valve gate faced anew.
1	Hanging machine with new nut, new screw and new punch.
23	Hydrants.
11	Air pumps.
749	Pick axes.
545	Tools for cutting and caulking pipes.
16	Steel drills.
37	Fire irons.
Brass Castings delivered from Foundry for the	
year 1889.....	17257 lbs.

4th. TAIL RACE.

The wood work of the bridge over the Tail Race at the Lower Lachine Road was rebuilt. The masonry is in bad condition, some of the stones of the upper courses in both abutments requiring resetting and nearly all above water require pointing.

Some trifling repairs were done to the fences.

5th. PIPE TRACK AND PUMPING MAINS.

The Revetment wall holding up the bank on the west side of Atwater Avenue between St. Antoine and Dorchester streets is

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considerably bulged in places and looks as though it might soon fall down. This was reported to the Water Committee who ordered it to be temporarily stayed, which was done, intending to have it rebuilt this year.

Atwater Avenue south of St. James street has the appearance of a public street, people of St. Henry and St. Cunegonde having built fronting on it.

The duplicating of the 30 inch pumping main was carried out from the Wheel House to St. Antoine street, with the exception of a gap at the Grand Trunk Railway and St. James street and another near St. Antoine street. Under the River St. Pierre and from there southward to the Grand Trunk Railway, the pipe is doubled to provide for future needs. The culvert through which the pipes pass under the Railway is large enough to carry two 30 inch pipes and in fact the double line is laid half way through it and the incomplete line can be completed, whenever wanted, at very small cost.

The contract for this culvert, which a 10 ft. stone arch, was let to Mr. Peter Nicholson for \$4000.00, a very low price. However he completed the work satisfactorily, but now asks to be compensated for loss which he alleges he sustained through the Grand Trunk Ry. by exacting heavier work than he had anticipated for the protection of their tracks. His demand has been referred to the City Council.

The delivery pipe from No. 1 turbine is connected to the new 30 inch main and the arrangement affords considerable relief to the water power machinery generally, the discharge from which, prior to this alteration, was somewhat congested in the vicinity of the pumps. This improvement was projected and partly provided for by the late superintendent, just before his illness incapacitated him for business. The plan includes a connection between the new 30 inch main and the two 24 inch mains passing through the tunnel wall at a point about 50 feet from the north end of the Wheel House. Bad weather and other unforeseen causes of delay, brought the work so late in the season that it was deemed advisable to postpone its completion until the summer of 1890. The requisite special castings are all provided and it is intended to make the connection this year. A 24 inch branch line is taken from the new 30 inch main in Centre street and has been carried eastward in that street and connected at St. Luke street and Napoleon Road with the distribution pipes of St. Gabriel Ward.

6th. RESERVOIRS.

The masonry of the high level reservoir was carefully examined, the cement in all bad joints scraped out and the joints refilled as far as possible and the whole, well pointed. The reser-

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voir was also thoroughly cleaned out. On refilling, the leakage was found to be reduced to almost nil. What remains being probably percolations through unobserved fissures in the rock bottom.

The drain pipe from this Reservoir was trapped. It is a 12 inch iron pipe as far as the foot of the slope in front of the reservoir from which point a tile pipe is used as far as the city sewer in Peel street. This tile pipe gives out whenever used and it is necessary to substitute iron pipe to avoid damaging property close by.

The front and end walls of McTavish street reservoir underwent extensive repairs, which they very much required and which resulted in stopping almost entirely the leakage. When the water was out, the Reservoir was found to have a very considerable accumulation of sediment, which should be removed as soon as possible.

The old part of the division wall, is in very bad condition, so bad in fact, that as a division wall, it is useless. Repairs will be attempted this year.

The dry retaining wall on the lower side of Carleton Road, was repaired.

Many parts of the wall holding up the foot of the slope of the reservoir embankment are giving way and should be repaired this year.

Some trifling repairs to the Valve House are also needed.

The report of the Engineer of the High Level Pumping station, who is also guardian of both Reservoirs, gives full details. Said report will be found in appendix.

7th. HIGH LEVEL SERVICE.

The buildings are in very fair order. The Engineer's report, in appendix, page 14 gives all necessary information on minor points.

No. 2 Engine (the new Gilbert engine) did nearly all the pumping, No. 1, the old non condensing Worthington, having merely worked about 60 hours, on two occasions, the first whilst the Peel street Reservoir was undergoing repairs and cleaning and the other, when condenser of No. 2 was being repaired.

The engines are both in good condition, as is the one boiler also. But the risk of being without a spare boiler, is such as should not longer be run. The boiler was fitted with the Lead-beater bars and steam jets.

The high level district is being gradually extended, as the increased pumping done in 89 over that in 1888 plainly indicates, the former being 54 % above the latter. The increase in the area supplied from these works will not however account entirely for the great increase in consumption and it is very probable that

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the high pressure keeps the fittings in houses more generally out of repair, than they are in the low level district and that consequently waste is much greater there, in proportion to population.

Schedules 6 and 7 in the appendix show the number of gallons pumped during the year to have been 126,419 000 gallons, with an expenditure, as taken from schedule 16, of \$3259 $\frac{1}{10}$ equal to \$25.78 $\frac{1}{10}$ per million of gallons pumped, or \$0.12 $\frac{1}{10}$ per million raised 1 foot high.

The cost of raising 1 million gallons 1 foot high, was :

In 1876.....	\$0.240
" 1877.....	0.253
" 1878.....	0.355
" 1879.....	0.283
" 1880.....	0.274
" 1881.....	0.226
" 1882.....	0.256
" 1883.....	0.286
" 1884.....	0.318
" 1885.....	0.376
" 1886.....	0.250
" 1887.....	0.187
" 1888.....	0.197
" 1889.....	0.121
Average of 14 years.....	0.259

Sth. PIPE LAYING.

~~2742 feet of cast iron pipe laid in the City during the~~
~~year 1889, or 10 1/10 miles, the weight of metal being~~

~~196,000 lbs. of cast iron pipes laid and their lengths were~~
~~24 inch 1103 feet, 12 inch~~
~~24 inch 3454 feet, 8 inch 989 feet, 6 inch 20124 feet~~

~~valves laid, viz, 4 of 30 inch, 1 of 24 inch, 39 of~~
~~12 inch, 1 of 8 inch, 140 of 6 inch, and 55 of 4 inch.~~

~~valves put in are not for distribution~~
~~to factories, to elevators, or to stand pipes~~
~~in buildings. It is now a rule of the Department~~
~~that no valve of smaller internal diameter than 6 inches, be~~



~~put in during the year is 196, of these~~
~~valves and the remainder two nozzle~~

~~iron pipe, of 2" diam, laid is 54 feet. Lead~~
~~put to 2,934 houses,— 2,930 stop cocks,~~

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of which 2,748 are pneumatic cocks, the balance being the old kind of plug cock

Schedule No. 12 in appendix shows the work done in pipe laying in the different streets and wards of the City during the year.

The old pipes taken up or abandoned in the ground as useless, amounted to 9,450 feet, and there were for the year '88 (omitted from the record of that year) 10,590 feet of pipe abandoned in the ground, making for the two years 19,940 feet or 3.77 miles to be deducted in order to arrive at the actual pipe mileage of the City. In Schedule No. 13, this deduction has been made and the result shows the length of pipe in use in the City (not including house services) up to December 31st '89 to be 884,176 feet or 167½ miles.

9th. MAINTENANCE OF DISTRIBUTION PIPES, SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

Schedules Nos. 9 and 15 and the report of Mr. Lagacé, foreman of distribution, in appendix, give details of all work under this heading. Repairs to distributing mains were about the average. There are some mains known to be in bad order and to have been so for years. The cost, of searching for leaks on them and of repairs to them and of the water wasted through them, is very considerable and would warrant uncovering the pipes and putting new ones in their places or at least recaulking all joints and in some cases melting out and renewing the joints. This work will be recommended to the Water Committee to be done during the current year.

The number of leaks on service pipes is unusually large.

Hydrants found frozen are much fewer than ordinarily. Repairs to hydrants have been very considerable, consisting principally of renewing of valves and of rods. The practice of allowing the fire hydrants to be used for other purposes than that one important purpose for which they are ostensibly put in position and from which they derive their name, cannot be too strongly condemned. Constant inspection of them is necessary in order to find out which ones have been injured and require repairs and after all there must be a certain doubt that some hydrant at some critical moment, may be found unfit for service. The men of the Fire Department alone, should be allowed to use them and special stand pipes should be provided for the Road Department's men, where they could get water, for street sprinkling and other purposes.

Only one ornamental fountain was put in during the year namely that at Cherrier Square, St Jean Bpt. Ward.

Schedule No.16 shows the expenditure under each of the foregoing heads.

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10th. CONSUMPTION OF WATER

The total quantity pumped during the year is 4,694,227,000 gallon being 218,194,000 gallons less than in 1888. The daily average consumption was 12,861,000 for '89, against 13,442,000 for '88. $\frac{3}{4}$ of the whole quantity pumped was pumped by water power, and the balance by steam, that is, the water power furnished a daily average of about 9 $\frac{1}{2}$ millions. See schedule No 5 in appendix.

The purposes for which the water has been used will be found, classified, in the report of the assistant Supt., in appendix, which report also gives the quantities under the different heads.

11th. METERS AND HOUSE TO HOUSE INSPECTION.

The number of meters in use is 670. As water sold by meter gives an average price of 18cts per 1000 gallons against 13 $\frac{1}{2}$ cts. per 1000 for that sold at rates based on rental, it would seem desirable to encourage the use of meters for all but the domestic supply.

All requisite information in reference to the meter branch of the Water Dept., as well as full details touching the House to House Inspection, will be found in the Assistant Supt's. report and in schedule No. 11 hereto appended.

12th. ADMINISTRATION.

Schedule 16 in appendix gives in detail the expenditure for maintenance as well as for improvements. The first shows a total of \$93,534.64, which is somewhat less than the appropriation. This is no proof that the money asked for and granted was greater than actually required. On the contrary much more could have been profitably expended, and the discrepancy may be attributable in some measure perhaps to over precaution and the desire not to exceed the appropriation of council.

The expenditure for improvements amounts to \$232,713.89. This covers pipe laying, the balance on the Worthington Engine, Royalty on patent Pneumatic stop cock, and outside professional services.

13th. GENERAL REMARKS.

The condition of the works generally, during the year, may be characterized as efficient.

There was no complaint of want of water at any fires,—no serious break down of machinery and no stoppage of supply to any part of the city for any considerable time.

This should not be taken as an indication that nothing is wanted in the way of improvement or addition to the works. At page 33.

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of appendix will be found a special report from the Superintendent calling the attention of the Water Committee to some of the most pressing requirements of the Department. No action was taken however.

The completion of the large aqueduct, one section of which was made upwards of twelve years ago, seems no longer to occupy the attention of the council or even of the Water Committee and yet the necessity for increase of supply, from some source, becomes every year more apparent. The mode of obtaining that increased supply was determined on years ago, upon the advice of men eminently competent to advise on such a question. The value of the land required for the new works proposed, increases year by year, as the city and suburbs extend.

If the works are to be constructed at all, it is certain that postponing the matter, will enhance the cost and if commenced at once, they will not be completed any sooner than wanted.

The principal improvements contemplated this year are in pipe laying. The 24 inch main commenced in Centre street will be extended to Montmorency and along Montmorency and across the Canal to William street where it will be connected with the 12 inch of that street. On St. Catherine street from Peel westward to Closse a 12 inch pipe will be laid, fed from the High Level Reservoir. This pipe is intended for fire service, the pressure on the low level main in this district being inadequate.

The 20 inch High Level Pumping main will be extended up McTavish street and westward on Pine Avenue to the head of Peel street.

Several other streets, on which the Road Dept. intends laying permanent paving, will require their water pipes renewed.

The energy and ability brought to bear, in the discharge of their duties, by the officials at the heads of the several branches of the Department, has been very gratifying.

I have the honor to be

Gentlemen,

Your obedient servant

B. D. McCONNELL,

Supt. M. W. W.

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Report of the Assistant-Superintendent of Water-Works, on Meters and House-service inspection, for the year 1889.

Montreal, 16th. June 1890.

B. D. McCONNELL, Esq.,

Supt. M. W. W.

I herewith beg to submit, for your information, the following brief report upon the meter and house-service inspection branches of the water department for the year 1889.

METERS.

The number of meters in use, inclusive of those at the wheel house, at the end of the year was 670, showing an increase of 44 over 1888. The city owns 610; the other 60 belong to private individuals or companies.

There were 106 new places metered and 58 meters in use were discontinued.

There were 119 changes of meters made for various reasons, some being out of order and others too small.

The number of meters damaged by frost was 5.

One belonging to a private party was completely destroyed.

The department purchased during the year 112 new meters :

Crown.....	44
Gem.....	16
Empire.....	51
Hersey.....	1
	<hr/>
	112

and also 3 Crowns which had been in use by Mr. Rodgers.

There were also 10 meters purchased by private parties :

Crown.....	8
Gem.....	2
	<hr/>
	10

Seventy two (72) of the new meters purchased this year were used to replace the old Union meters which were in use for a number of years and completely worn out.

There were 11 meters at the harbour latrines and drinking fountains, where over $12\frac{1}{2}$ millions of gallons of water were used, showing about the same consumption as last year. The city supplies this water to the harbour without charge.

There were 5 meters at the Low-Level Pumping Works, 3 to measure the water used at steps of turbines and 2 to feed water to boilers.

The water sold by meter last year and the previous year was as follows :

	Millions of Gallons	
	1888	1889
Railways (including street Railway).....	150.66	153.62
Factories and Engines.....	97.54	121.82
Elevators (exclusive of those at R'ys & Hotels)....	103.55	115.69
Breweries.....	23.52	23.11
Hotels.....	38.20	36.54
Schools, Convents & Colleges.....	15.88	18.39
Hospitals & Homes.....	9.53	7.89
Churches & Organs.....	5.35	3.82
Miscellaneous as photographers, livery stables, skating rinks, horse exchange, restaurants, dyers, florists, &c.....	19.42	14.46
Outside Municipalities.....	22.39	20.82
Totals.....	486.04	516.16

Showing and increase of 6.20% over 1888.

HOUSE SERVICE INSPECTION

This inspection has been kept up throughout the year, 5 inspectors being engaged on it.

The result of this inspection was the discovery and stoppage of waste from defective fittings as enumerated below, viz :

Bib cocks out of repair.....	2812	wasting	29666	galls per hour
Urinal " " "	80	"	1346	" " "
Ball " " "	1412	"	22492	" " "
Stop " " "	72	"	1405	" " "
Closet " " "	222	"	4361	" " "
Basin " " "	168	"	1820	" " "
Closet valves out of repair.	137	"	3426	" " "
Water closet " "	68	"	2450	" " "
Pipes burst " "	907	"	11041	" " "
Other defective fittings.....	12	"	345	" " "
Total defective fittings.....	5890		78352	" " "

Supposing for a moment that this inspection is not made, a great part of these fittings would not be repaired and would leak during the whole year, increasing the consumption considerably.

To show the importance of this inspection we will admit that each of these leaks runs for 30 days (this supposition could be made much higher).

The total waste for 30 days will be :

$$78,352 \times 24 \times 30 = 56,413,440 \text{ gallons.}$$

The water being charged at 14 cts per 1000 gallons the revenue would be :

$$56,413,440 \times \$0.14 = \$7,897.88$$

The expenses for the 5 inspectors for the year is \$3,000.00. The difference \$4,897.88 is the saving.

As it takes about 6 months, with the 5 inspectors we have, to go all over the city, the leaks here enumerated are only a small fraction of what is really wasted.

The inspectors found also the following irregularities :

Taps opened to prevent freezing.....	38
“ “ “ flush drains.....	41
Using water illegally for building purposes.....	147
“ “ “ manuf. “.....	17
“ hand hose illegally.....	116
Hydrants used without a permit.....	10
Total.....	369

All cases of illegal use of water were arrested as soon as discovered. The number of prosecutions in the recorder's court was 107.

COMPARISON OF METER RATES WITH RATES BASED ON ASSESSED RENTAL.

	Gallons.
The total quantity of water pumped in 1889 is.....	4,694,227,347
That bringing no direct revenue was:	
Flooding private rinks, etc.....	2,020,738
Fires.....	7,777,570
Watering streets.....	57,049,260
Public Fountains.....	30,456,000
Harbour.....	12,569,023
Steps of Turbines.....	13,324,319
Total.....	123,197,510
Balance producing Revenue.....	4,571,029,837

	GALLONS.	GALLONS.
Balance producing revenue.....		4,571,029,837
That charged for at meter rates:		
Railways (including Street Ry.)...	153,624,667	
Factories and Engines	121,822,993	
Elevators (Exclusive of those at Hotels and Railways).....	115,692,221	
Breweries	23,109,868	
Hotels.....	36,535,807	
Schools, Convents & Colleges	18,391,417	
Hospitals & Houses.....	7,890,750	
Churches, for Organs.....	3,817,420	
Miscellaneous, Livery Stables, skating rinks, Restaurants, dyers, &c.	14,459,414	
Outside City Limits.....	20,824,244	
Total		516,168,801

Balance, being that charged for at rates based on rental and special rates and including waste.....	4,054,861,036
The revenue from water in 1889 was..	\$637,386.36
That from metered water including rent of meters was.....	\$93,648.69
Balance being revenue from rates based on rental and sundry special charges.	\$543,737.67
Total water from which revenue is de- rived	4,571,029,837 galls.
Revenue from same.....	\$637,386.36
being at the rate of 14 cents per 1000 gallons.	
Total water sold at rates based on rental.....	4,054,861,036 galls.
Revenue from same.....	\$543,737.67
being at the rate of 13 $\frac{3}{4}$ per 1000 gallons.	
Total water sold at meter rates.....	516,168,801 gallons.
Total revenue from same.....	\$93,648.69
being at rate of 18 cents per 1000 gallons.	

The number of prosecutions for violation of the by-law relating to meters was 2.

The monthly inspection and reading of all meters in use, has been kept up as usual.

Your obedient servant,

J. O. ALFRED LAFOREST,

Assistant-Superintendent

M. W. W.

SUMMARY OF STATISTICS

REPORT OF 1889.

IN ACCORDANCE WITH THE RECOMMENDATION OF THE NEW
ENGLAND WATER WORKS ASSOCIATION.

MONTREAL WATER WORKS.

Montreal, county of Hochelaga, Province of Quebec, Canada
supplies also the municipalities of Maisonneuve, Côte St. Antoine
Côte St. Louis, St. Louis du Mile-End and Côte de la Visitation.

POPULATION.

Montreal (estimated in 1889).....	235,000
Maisonneuve	1,200
Côte St. Antoine.....	1,600
Côte St. Louis.....	3,000
St. Louis du Mile-End	3,000
Côte de la Visitation.....	600
Total.....	244,400

DATES OF CONSTRUCTION.

LOW LEVEL SERVICE—

wheels 1 and 2 (3/2)	Aqueduct	1856
	1/2 Breast Wheels, with six pumps.....	
	Capacity 4 million gallons per diem.	
	1st 24 inch Rising main.....	1865
	McTavish Street Reservoir, 15 million gallons....	
	1 Turbine wheel with two pumps.....	
	Capacity 4 million gallons per diem.	1867
	2nd 24 inch Rising main.	
	Bartley Steam Engine, 3 million gallons.....	
	Gilbert do do	1872
wheel 3 (3/2)	Tail Race lowered.....	
	Turbine substituted for Breast Wheel.....	
	Worthington Steam Engine, 8 million gallons.....	1875
	1st 30 inch Rising main.....	
	New entrance to Aqueduct opened.....	
	Extension of McTavish Reservoir, bringing its capacity to 35 million gallons.....	1878
	4 Turbine Wheel 2 pumps, 2 1/2 million gallons.....	
	Bartley Engine removed.....	
	Worthington Steam Engine, 10 million gallons....	1886

HIGH LEVEL SERVICE—

Peel Street Reservoir, Capacity $1\frac{1}{2}$ million gallons.	} 1875
Worthington Steam Eng. do $\frac{1}{2}$ do per diem.	
1—12 inch Rising main.....	
Gilbert's Steam Eng. Capacity 3 million per diem.	1889

BY WHOM OWNED.—City of Montreal.

SOURCE OF SUPPLY.—River St. Lawrence.

MODE OF SUPPLY.—Open Aqueduct 5 miles in length.

74 per cent pumped by water power.
26 do steam do

PUMPING.

1. Builders of Pumping Machinery—
 Water Wheels.—Wm. Fairbairn & Son, Manchester, England.
 John McDougall, Montreal.
 W. P. Bartley & Co. do
 R. D. Wood & Co., Philadelphia, Pa.
 Steam Engines.—W. P. Bartley & Co. Montreal.
 E. E. Gilbert, do
 Henry R. Worthington, New York.

DESCRIPTION OF COAL USED.

	Low level service.	High level service
Kind.....	Bituminous.	Anthracite.
Size.....	Broken.	Broken & Stove.
Brand.....	Scotch & Nova Scotian.	Welsh & American.
Price per gros ton... \$5.00.....	\$3.85	\$ 5.20
Percentage of ash.....	5.70	11.63
5. Coal consumed for year lbs.	4,826,390	455,648
6. Total pumped by steam gallons.	1,211,347,586	126,418,495
7. Average static head in feet.....	169	213
8. do dynamic do	184	265
9. Gallons pumped per lb. of Coal.	251	277
10. Duty, ft. lbs. per 100 lbs. of Coal (no deductions).....	46,181,100	76,853,016
6. Total pumped by water power for year, in gallons.....	3,482,879,761	
7. Average static head, in feet.....	189	
8. do dynamic do	193	

COST OF PUMPING FIGURED ON PUMPING STATION EXPENSES.

	Low Level Service.		High Level Service.
	By water.	By steam.	By steam.
viz :	\$5,674 71	\$15,960.60	\$3,259.81
11. Cost per million gallons raised against dynamic head.....	\$1.63	\$13.17	25.77
12. Cost per mill. gall. raised 1 foot (dynamic).....	0.00 ₁₀₀	0.07 ₁₀₀	0.09 ₁₀₀

CONSUMPTION.

1. Estimated total population at date...	235,000
3. do do supplied...	234,000
4. Total number of gallons consumed...	4,694,227,347
5. Passed through meters, domestic. 371,23 mill. galls or 8 pere.	
6. do manufacturing. 144,93 do or 3 do	
7. Average daily Consumption..gallons.	12,860,897
8. Gallons per day to each inhabitant...	54.7
9. do do consumer.....	54.9

DISTRIBUTION.

1. Kind of pipe used.....	Cast Iron.	Wrot, iron & lead
2. Sizes do	3" to 30"	2½" and under
3. Extended, feet.....	53186	
4. Discontinued, feet.....	9350	750
5. Total now in use, miles	165½	2
9. Hydrants added in 1889.....	182	
10. do now in use.....	1403	
11. Stop Gates added.....	259	
12. do now in use.....	1698	
15. Range of pressure on mains, day and night, at Fire Station No. 2 St. Gabriel Street.....	69	

SERVICES.

	Lead and Wrot. Iron.
17. Sizes.....	from 2½ to ½ inch.
18. Extended feet.....	58,435
21. Service taps added (new houses supplied)	2,934
22. Total now in use (houses supplied).....	37,577
23. Average length of service pipe.....	20 feet
24. do cost do do	10.24
25. Meters added.....	125
26. do now in use..	886
28. Motors now in use.....	163

J. O. ALFRED LAFOREST,

Asstt-Superintendent, M. W. W.

LOW LEVEL PUMPING STATION, M.W.W.

JANUARY 22nd 1890.

B. D. McCONNELL, Esq.,

Superintendent Water Works.

DEAR SIR,

I respectfully beg to submit my annual report for the year ending December 31st 1889.

No. 1 WHEEL HOUSE

The repairs done to this building consist only of the renewing of the north door and frame and some slight patching to the wood work. I recommended the painting of the doors and windows in my last two reports, which was not done, they are now in a very unsightly condition and fast going to rot, they should be painted as early as possible.

The stone steps at the north end were demolished in consequence of pipe laying. I would recommend that they be replaced with wooden steps furnished with a proper stone foundation. The stairs in front of Engine House will have to be renewed also and all the outside stone work should be pointed.

Nos. 2, 3 & 4 WHEEL HOUSE.

No repairs were done to this building. The doors and windows are in the same condition as those of No. 1 and should be painted. A portion of the south end wooden sheeting where the large window was bricked up, and the walls adjacent to the iron doors should be repaired; also the large timbers of the head race retaining rack will require to be renewed.

THE WORK SHOP

There was no repairs done to this building nor is it likely to require any during the year.

BRASS FOUNDRY

This shop is in fairly good repair all that at present appears necessary is the repairing of the chimney.

THE DWELLINGS

I wish to especially call your attention to the very unsanitary condition of these houses: they were built about twenty-five years ago under the then idea of sanitary arrangements with the water

closets in the wood sheds, which has been so unsparingly condemned by Mr. St. George in his public reference to the sanitary condition of the houses of the afflicted Goose Village at Point St. Charles. In order that these houses be brought up to the present sanitary requirements, it will be necessary to build extension kitchens where closets and bath rooms could be placed. The repairs recommended to these buildings in my last year's report were not carried out. The windows, double windows and the whole outside wood work generally should be painted and the outside back stairs renewed, with some other minor repairs.

Nos. 1 & 2 ENGINE HOUSE

This building is in good order and not likely to require any repairs during the year. An oil cloth on the floor would very much improve its appearance.

No. 3 ENGINE HOUSE

This building is in good order, all the repairs that at present appear necessary is the painting of the outside of the three doors.

THE BOILER HOUSES

Are in fairly good order with the exception of the floors of Nos. 2 & 3 boiler houses which are very much worn, they should be renewed.

THE COAL SHED

A number of the upright cast iron posts were lifted and properly reset. The remainder will also be reset as soon as opportunities will permit.

THE GROUNDS

are all uprooted, consequent upon the laying of the new mains. They should be thoroughly re-embellished. The bridge spanning the St. Pierre river on Atwater Avenue, in the immediate vicinity of the works, requires new planking. The Waste-Weir front of the Machine Shop had its covering renewed and is in first class condition.

No. 1 TURBINE WHEEL

All the repair done to this wheel was the renewing of four of the stay bolts in one of the valve chests. The wooden cogs in the large bevelled wheel on the counter shaft are much worn and may require renewing before the close of the year. The wheel is otherwise in good order.

No. 2 WHEEL

This Wheel has added another year to its existence, through being carefully nursed. The repairs are general, and often to all its parts, it seems to bear out the old adage that "creaking wheels last a long time on the road." Heavy repairs may be looked for at any time. A portion of the head race covering gave away. I had it all taken down and replaced in a substantial manner.

No. 3 WHEEL

The pumps and connections of this wheel are like those of No. 2, very much worn and shaky, they are stayed and held together in every conceivable make shift manner, several of the joints connecting the pumps to the delivery pipes were remade and repaired. The anchor or holding down bolts were better secured and several of the joint bolts renewed. The plunger and plunger rod were taken out of the center pump, the plunger rod nuts being found to be split and the thread very much corroded. The rod had to be returned and furnished with new nuts. The water from the Tail Race is making its way through many of the joints of the foundation wall. Something will have to be done with this next summer.

No. 4 WHEEL

This wheel worked well requiring only such repairs and attention as are consequent upon running machinery. There is a perceptible leak by the pump pistons which will be looked into at an opportune time.

No. 1 WORTHINGTON ENGINE

This Engine did all the pumping by steam with the exception of sixteen days occasional runs by No. 3 Engine, and performed its duty well. It was stopped on the 7th of April, that date closing the winter pumping season. The engine was then very generally overhauled, one of the low pressure pistons was found in a leaking condition necessitating its being entirely refitted, which was done. The other low pressure piston was examined and its rings properly set out. The four steam chests had to be lifted and their joints re-made, between them and the cylinders, also two of the high pressure valve cover joints.

In order that this work should be done, a very general pulling down of the engine was necessary to get at the work. The jacket tank was looked into and the ball valve found out of order and was set right. The independent air pump gives considerable trouble through the breaking of the gland studs, several of which had to be renewed. The suction and delivery valves of the same

give trouble. We removed all the spiral springs from these valves and substituted for them lead weights, which we find a great improvement. The boiler feed pump broke one of the rock shafts, which was repaired and the pump otherwise generally overhauled. The giving out of this pump necessitates the stopping of the main engine until it is again put in working order, I hope you will find it convenient this year to furnish me with another boiler feed pump.

The engine and all its connections are at present time of writing in first-class order, ready to perform the winter work.

Present appearances indicate that all the attention the engine will require during the year in the shape of repairs is, that consequent upon the proper keeping up of running machinery, which will be considerable in this case owing to its magnitude, great complication, and many parts.

No. 3 ENGINE

This engine did very little work during the year, No. 1 Engine being so much more economical, it is made to do all the pumping required by steam or as much as it possibly can do, No. 3 being kept in reserve. It is ready to do duty, but is in need of a very thorough overhauling. It is the practice in water works when the thorough overhauling of engines are required to give the job to the builders of the engines as they are especially conversant with their engines and carry into the engine, when overhauling, all the new features which they have added to their engines, or as much of them as the overhauling will permit of and have all the special appliances for the work. If myself and staff are expected to do this work I am ready to undertake it, but it will entail the long laying up of the engine as my staff can only be employed at it from time to time, as they may be spared from their other machinery.

I am of opinion that the work should be pushed through vigorously in order that the engine may be ready for service as soon as possible, there being no knowing when some other portion of our machinery may give out. The engine should also be painted.

No. 1 BATTERY OR HEINE BOILERS

This battery furnished all the steam required for pumping during the year, with the exception of some sixteen days run, made by No. 2 Battery, and worked well. The damper in the main flue was of poor construction, it buckled so as to be unserviceable. I had it taken out and flanged with one and one half inch angle iron. It was again put in position and has given no trouble since.

A set of Elliott grate bars was furnished, and shortly afterwards removed to make way for the Leadbeater appliance, which appliance enabled us to burn coal that we were unable to burn previous to its adoption. This appliance is very hard on fire brick, in consequence of which we have to frequently rebuild our boiler furnaces and the bridge walls. The great draft furnished to the boilers by the steam jets, forces the smoke through every crevice around the boiler setting into the boiler room, from which it finds its way into the engine room, blackening the walls and ceiling, making it difficult to keep the place clean. Still if I am to continue to burn International coal, I want another Leadbeater furnace applied to the other Heine Boiler, and that, as soon as possible. If I am furnished with Scotch coal, I don't want it.

No. 2 BATTERY OF BOILERS

This battery is in good order, all that will be necessary is the taking down of the main steam pipes and remaking the joints.

No. 3 BATTERY OF BOILERS

This battery did not work during the year. The boilers are in good order, cleaned, oiled and properly laid up.

THE PORTABLE STEAM PUMP AND BOILER

This pump performed considerable good service adjacent to the works at the laying of the 30" mains after which it was properly laid up. It is in good order, ready for service.

The change and addition you have made to the pumping mains in the vicinity of the works have had the effect of lowering the pressure 10 lbs per sq. inch on all our pumping machinery which is of great and substantial importance, it being equivalent to the adding of 11½% to the hydraulic working under the old condition.

In conclusion I beg to tender you my warm thanks for the able and valuable assistance you so cheerfully gave me from time to time, in the discharge of my duty.

The whole respectfully submitted,

I have the honor to be Sir,

Your obedient servant,

D. KEARNEY,

Engr., L. L. P. W.

HIGH LEVEL PUMPING STATION, McTAVISH STREET

JANUARY, 1890.

B. D. McCONNELL, Esq.,

Supt. Water Works.

SIR,

I respectfully beg to submit my annual report on performance of work done, condition, and requirements at McTavish street, and High Level Reservoirs.

THE WORTHINGTON ENGINE

Is in the same condition as last year, and requires but a few light repairs: it worked about one week last summer during the cleaning of High Level Reservoir.

THE GILBERT ENGINE

Has worked well throughout the year, and gave no trouble other than the cracking of cover of the condenser, caused by unequal shrinkage of the casting; and the shifting of 6 tubes in condenser, caused by expansion and contraction of the tubes by heat and cold. We had them set back and the ends riveted or beaded to prevent them shifting again. The engine is working every day. I put 24 brass valves into high pressure pump a year ago, they have worked well and show very little sign of wear. I renewed 62 rubber valves and 2 springs during the year. The steam pipe would look much better if covered with cotton cloth and painted.

I would recommend the purchase of the big plungers from Mr. Gilbert, as they are fitted to the pumps and we would have no delay in case we wanted to increase the pumping capacity.

THE BOILER

is in good condition, and worked well last year, we renewed two tubes in the water heater.

We got a Leadbeater patent steam jet put on the boiler to increase draft and burn inferior coal; it has worked well.

I think it would be advisable to get another boiler for reserve, it is not safe to depend on one only.

THE OLD ENGINE HOUSE

The walls require whitewashing, and the wood work to be varnished. The cement water-course around outside of building is

broken up with frost, and will require to be renewed. I think wood blocks the best.

THE BOILER HOUSE

is badly in need of a floor of flagstone or cement, and 2 new porches, a ventilator in roof to let out coal gas, and an ashpit. The banks in front of this building require grading and sodding.

We want an iron door for base of chimney, also a tapering cap for top of chimney to decrease the outlet and increase draft.

THE NEW ENGINE ROOM

This building is in good repair, the cornice outside and the new porch require painting. I would require a pair of travelling cranes and a set of cupboards in this building and to get the floor covered with oil cloth or painted.

THE COAL SHED

The roof of this building is leaking badly and requires to be fixed this coming summer, the cornice to be painted and a concrete floor laid.

THE TELEPHONE

has worked very poorly during the past year, and our communications with the wheel-house since the circuit was changed, have been anything but satisfactory.

THE HIGH LEVEL RESERVOIR

underwent a thorough repair; the joints pointed and grouted with cement; it was washed out and swept.

The 12 inch iron over flow pipe should be continued from foot of bank slope to Pine Avenue, the tiles in use at present are defective and leaking. A new door is wanted for Valve House, also to paint door.

Owing to the increase of consumption on the High Level Service, it would be an improvement to continue the 20 inch main pipe to the High Level Reservoir, or at least to corner of Pine Avenue and Peel Streets. At present there is but one 12 inch main from Engine house on McTavish Street, which has to furnish three 12 inch pipes on Pine Avenue, this change would relieve the pressure on our pumps by about 15, lbs to the square inch.

McTAVISH RESERVOIR

The old portion or front wall underwent a thorough repair: the joints all grouted and pointed with cement, and is now in good

order ; but the old portion of the centre wall requires a thorough cementing, it leaks so badly from one side to the other, that we cannot make a reserve in either. The waste water drain was trapped in McGill College Grounds, to prevent foul gas coming into the Valve House, it has been a success, so far.

The front wall on Carleton Avenue needs repairing, also to have same all capped or covered down with boards, the same to be tarred to protect them from the weather, it will require about 400 one inch boards and 50 three inch planks : the old covering is all rotten.

The Reservoir wants cleaning this summer, there is about 3 inches of mud at the bottom, it has not been cleaned since 1877.

The flagmast requires a coat of paint, and new halcyards. I would like a small boat for north side of reservoir.

There is a leakage through masonry at back side of reservoir which admits surface water, this would require to be dug out, pointed and puddled with clay.

THE VALVE HOUSE

The walls outside want pointing, the roof, cornices and ceiling, want painting and the doors and windows to be oak grained. The covering over wells wants to be renewed, the old boards are dangerous to walk on, it is very important that these wells be covered anew.

The iron ladder in dry well requires a coat of paint. The flood gates in valve house should be renewed.

The grounds, banks and slopes were kept in good order, the grass kept cut and clean ; it would be well to place a dozen benches on the reservoir bank, the old ones are decayed and broken.

An electric light placed in front of Valve House would add much to the comfort of visitors who sit around in the evenings, and would be of great benefit to us.

The wooden fence around reservoir property, on McTavish Street, Pine and Carleton Avenues, wants to be straightened and painted, a wire fence at north side of reservoir would be much needed to keep people off grass slopes.

The Scale House requires a new floor ; the scales to be overhauled and inspected,

The Dwelling is in good repair, except a portion of the plaster in hall which is loose and liable to fall any moment. The drain pipes from Bath room must be seen to as soon as possible as they are somewhat defective and cause a very bad smell throughout the house. A new set of heating pipes will soon be required, the present ones are getting old and leaky.

The window blinds, sashes, and cornice of dwelling want painting; the sashes and blinds of the buildings number about 40 of each.

The whole respectfully submitted,

I have the honor to be, Sir,

Your obedient servant,

JAMES COLEMAN

The following will be required for the ensuing year:—

400 tons American Coal.
 15 " stove "
 6 brls. Valvoline.
 400 lbs. Cotton waste.
 75 " 1 in. Asbestos packing.
 50 " $\frac{1}{2}$ " "
 50 " Flax packing.
 1 doz guage glasses.
 2 " rubber washers.
 12 lbs Asbestos cardboard.
 3 tube cleaners
 1 set rubber valves for pumps.
 12 lbs. Plumbago powder.
 5 lbs. Redlead.
 6 doz. Mudport rubber washers.
 2 " Rubber washers for oil caps.
 6 balls Asbestos wick.
 10 yards Tape for joints.
 6 balls cotton wick.
 1 doz. small mops for oiling engine.
 50 lbs. Whitelead.
 5 Gals Paint oil.
 1 Bbl. Coal Oil for cleanng machinery.
 2 " Boiler Compound.
 4 Quires Emery cloth F.
 $\frac{1}{2}$ doz. Files.
 2 Gals turpentine.
 10 lbs Copperwire for valve guards.
 300 Fire bricks.
 2 Bags Fire Clay.

- 1 Set Grate bars.
- 2 Bbls. soft soap.
- 12 doz. Concentrated Lye.
- 6 Deck Scrubbers.
- 1 doz. corn brooms.
- 1 Set Taps and dies for gas pipe.
- 1 Pipe cutter and gas tongs.
- 1 Pive Vice.
- 2 Coal Scoops.
- 1 doz. Snow shovels.
- 1 Small Boat for Reservoir.
- 3 Yards Brass Wire cloth (sundries).
- 2 Gals. Olive Oil for handlamps.
- 50 Stove pipes.
- 12 Elbows.
- 60 Yards Cotton cloth to cover steampipes.
- 7 Cords firewood.
- 2 Yards Rubber cloth.
- 1 Sheet iron lining for chimney top.
- 1 Cast iron door for base of chimney.
- 1 Double porch for boiler house.
- Keeping grass cut & cleaned, and grounds clean.
- The big plungers to be purchased from Mr. Gilbert.
- A new boiler (extra one).
- 2 Travelling cranes for Engine room.
- 1 doz. Benches for reservoir banks.
- New cupboard for engine-room.
- 1 Ash pit.
- Painting floor of new engine room.
- Floor for boiler room; repairing, grading & sodding of banks in front of building.
- Repairing water course around engine house.
- 2 File Brushes.
- 2 Ventilators in roof, engine room & b. r.
- Varnishing & whitening old engine room.
- Repairs to Worthington engine.
- Repairs to roof of coal shed & painting cornice.
- New door for H. L. valve house and painting same.
- Boards to cover front wall at McT. reservoir tarring same, men's time.
- To clean Reservoir.
- Paint flagmast, and new halyards.
- To paint valve house and fix walls.
- Covering wells & paint iron ladder in well.
- Renew floodgates.
- An electric light (this would also light Carlton Ave).
- Straighten & paint fence on McTavish St. Carlton & Pine Avenues.

A wire fence for north side of reservoir slope.
New floor for scale house and fix scales.
To fix plaster and drain pipes in dwelling.
A set of steam pipes for dwelling.
To paint blinds and sashes.
To fix centre wall & back side of reservoir.
Painting cornice & porches of engine house.
Iron pipes for high level over flow 600 ft.

JAMES COLEMAN.



WATER WORKS SHOP. FEBRUARY, 1890.

B. D. McCONNELL, ESQ.,

Superintendent Water Works.

DEAR SIR,

I respectfully submit the report on the repairs done to main pipes, Stop-valves, Hydrants, Service-pipes : and Improvements to main pipes etc., during the year ending December 31st. 1889, which are as follows:

REPAIRS TO MAIN PIPES, STOP-VALVES &c.

There have been twenty breaks on main pipes and eighty-five joints blown out on said mains. Twenty-seven Stop-valves were renewed. Four valve spindles were broken and replaced by new ones.

Schedule No. 6. Shows the sizes and number of main pipes, and valves repaired. Also the number of leaks on mains and valves, which were one hundred and forty. Schedule 9 shows the improvements made to main pipes.

The improvements made on main pipes for the last six years, have given very good satisfaction : and the Firemen always find a plentiful supply of water at fires, where ever those improvements were made. More of those improvements are still required and in many streets, the main pipes should be renewed and replaced by larger ones. The main pipes in the following streets should be renewed before permanent pavements are made :

College street from McGill to Inspector streets.

St. Maurice street from McGill to Inspector streets.

St. Helene street from Notre-Dame to Lemoine.

St. Denis street from Craig to Albina.

Sherbrooke street from St. Denis to near McGill College ave.

The water Department should be notified twelve months before any streets are paved and no permanent paving should be made in any streets before all the water pipes are reported in good order.

The 4" main on Durocher street should be replaced by a larger one as it is now very defective from Sherbrooke street to Prince Arthur street.

The main pipes in the following streets are too small and defective and should be replaced gradually, year after year until all are renewed : renewing the most defective first.

Colborne street 4" & 6" mains from Notre-Dame street to Wellington street. This should be replaced by a 12" pipe.

Eleonor, from Notre-Dame to Ottawa streets.

Murray, from Notre-Dame to McCord streets.

Smith, from McCord to Colborn streets.

Young, from William to Wellington street.

Shannon, from half way below Ottawa to Wellington.

Ann, from William to lane below Brennan.

Nazareth, from William to Common.

Dalhousie from Wellington to Common.

Duke, from College to Common.

Prince, from Wellington to Common.

Queen, from William to Ottawa.

King, from William to Common.

Grey-Nun, from William to Common.

St. Peter street 10" main should be extended from St. Paul street down to the intersection of Common and Youville streets 12' main ; Youville street main should be extended to McGill street 10" main.

A 6" main should be laid on Seminary street from McCord to Olier street.

Basin, from St. Augustin to Seminary.

Olier street 4" main could then be connected to Seminary street. As it is now, when we shut McCord street all that district is without water and if the proposed improvements were made on Seminary, Basin, Olier streets, this much complained of inconvenience to the people would be avoided.

A 12" valve should be put on the 12" main on Wellington street east of the Grand-Trunk Railway connection so that we could shut Wellington street main any time, without causing any inconvenience to the Grand-Trunk Works near Sebastopool street. An 8" valve should be put on St. James street 8" main pipe North-west corner of St. Gabriel street so that we could shut the 8" pipe without shutting the 4" on the south side of St. James street, as it is now, one cannot be shut without shutting the water to both sides of said street.

A 10" valve should be put on Notre-Dame street 10" main west of St. Vincent street; as it is now we must shut from Notre-Dame Church to Bonsecours street.

A 30" valve should be put on Sherbrooke street 30" main pipe at the east side of St. Famille street.

The present shutting on the 30" main is from McGill College Avenue to St. Denis street.

A 12" valve should also be put on Dorchester street 12" main corner Windsor street.

The proposed 24" main pipe on Guy and St. James street should be laid as soon as possible, and the 24" Pipe Track should be carried by some street down to meet the 24" pipe at Delorimier Ave. and Notre-Dame street. This is very important for many reasons which I leave to you, Sir, to explain.

The two inch water-pipe in St-Jean-Baptiste street, should be replaced by a 4" pipe from St. Urbain street 12" main to the hydrant on Park Ave.

Fripponne street old 10" pipe (bad) should be replaced by a 6" pipe and connected to St. Paul and Commissioners streets; there are two dead ends on it now.

The main water pipes in the following streets have all dead ends.

Archambault Lane off Fullum street	1
St. Albert street St Gabriel Ward.....	1
St. Albert street off Fulford street.....	2
St. Albert street off Guy.....	1
St. Albert street off Canning street.....	1
St. Albert lane off Delorimier Ave.....	1
Arcade street off Guilbault street.....	1
Argyle Ave.....	2
Basin street west of Seigneurs.....	1
Barré street west of Hydrant at end.....	1
Bourgeois street off Wellington.....	2
Baxter Lane.....	1
Berri above Roy street.....	2
Berri above Ontario street.....	1
Beaudry near Sherbrooke.....	1
Burnett off Delorimier Ave.....	1
Chatham near William.....	1
Coursol at west limits.....	1
Cote des Neiges Hill.....	1
Congregation street near Leber.....	1
Charron below Favard.....	1
Capital west of Custom House Square }	1
Custom House Square east side }	1
Concord street off Bleury.....	1
Church St. off Ontario.....	1
Cathcart street at Philips Place.....	1
Champlain and Mount-Royal ave.....	1
Contant lane off Campeau street.....	1
Chaussé above Sherbrooke.....	1
Delisle street off Fulford.....	2
Duke street between William and College.....	2
Donegani street off Windsor.....	1
David Place off David lane west.....	1
Devienne street near St. Philip.....	1
Dufferin street and Mount Royal Ave.....	1
Dubord street near east of St. Denis	1
Desery street north of Ontario.....	1
Drummond north of Sherbrooke.....	2
Essex avenue near Quiblier.....	1
Edge Hill Ave. off Dorchester.....	1
Forgue Ave. off Guy.....	1
Fortier street east of German.....	1

Fullum street near Sherbrooke.....	1
Fullum lane off Fullum above Ontario.....	1
Grand Trunk street west end.....	1
Guy Ave. off Guy street.....	1
Grothé lane off Mignonne street.....	1
Gain street north of Dorchester.....	1
Gain st. near Lafont.....	1
Gain street north of Ontario.....	1
Harmony street off Amity.....	1
Hudon street off Desery.....	1
Jean Lane off Archambault near Fullum.....	1
Jacques-Cartier south of Notre-Dame.....	1
Lagauchetière east of Papineau Sq.....	1
Lafontaine west of Dufresne.....	1
Larivière lane south of Sherbrooke.....	1
Lorne Crescent Av. off Prince Arthur.....	1
Leroux lane off Seigneurs.....	2
Monette Lane off Versailles.....	1
Montmorenci off Centre.....	2
Mullins street near Napoleon Road.....	1
Mullins st. near and east of Hibern.....	1
Manufacturer street near Atwater avenue.....	1
Magdalen street near Leber.....	1
Magdalen near Grand Trunk track.....	1
Maple Ave. off Mullins.....	1
Milton street off Park Ave. and St. Urbain.....	3
Marie Louise Lane, off Sanguinet.....	1
Maisonneuve and Marie-Ann.....	1
Monarque, south of Notre-Dame.....	1
Montcalm near Sherbrooke.....	1
Maisonneuve below Sherbrooke.....	1
Moreau street at Small Pox Hospital.....	1
Mitchison Ave. off Cuthbert street.....	1
Mount-Royal Ave. and St. Hubert.....	1
Nelleda Lane, off Dufresne.....	1
New lane off Shaw below St. Catherine.....	1
New lane off St. Urbain above Milton.....	1
Ontario Ave. off Sherbrooke.....	1
Olier street off McCord.....	1
Oxenden Ave. off Prince Arthur.....	2
Ontario street west of Dezery.....	1
Overdale Ave. off Aqueduct street.....	1
Ontario west of Moreau.....	1
Patterson Ave. off Burnette street.....	1
Prefontaine street off Notre-Dame.....	1
Poupart street south of Logan.....	2
Papineau Square west side.....	1

Paxton Ave. off Richmond	1
Plessis street below Sherbrooke.....	1
Panet street below Sherbrooke.....	1
Picard lane off Sanguinet.....	1
Perrault lane east of St. Dominique.....	1
Phillips lane off Sanguinet.....	1
Plessis and Marie-Ann.....	1
Platt street off Ontario.....	1
Plateau street off Mance.....	1
Pea lane off Roy lane.....	1
Pichette lane off Barre street.....	1
Plymouth Grove off Canning street.....	1
Quessel street western limits.....	1
Quiblier street off Fort and Sussex streets.....	2
Rosary street off Wellington.....	1
Richmond street Pointe St. Charles.....	2
Richmond street near St. James.....	1
Richmond street near William.....	1
Redpath Ave. near Pino ave.....	1
Seaver street near Robillard.....	1
Sherbrooke near Shaw	1
Shaw north of Ontario street.....	1
Shaw street near Lafontaine.....	2
Sherbrooke street near Montcalm.....	1
Seaton street and Marie-Ann.....	1
Sophia lane off Craig.....	1
Sebastopool street near Leber.....	1
Stanley street near Ste-Catherine N. S.....	1
Stanley street above Sherbrooke.....	1
Summerhill Ave. off Guy street.....	1
Sussex Ave. near Quiblier street.....	1
St. Luke near Atwater Ave.....	1
St. Martin north of St. Antoine.....	1
St. Charles near Atwater Ave.....	1
St. Agnes street off Farm street.....	1
St. Chas Borrommée near Milton	1
St. Lawrence street and Mount-Royal Ave.....	1
St. Dominique and Mount-Royal Ave.....	1
St. Hypolite and Mount-Royal Ave	1
St. Hypolite street above and below Ontario.....	2
St. Christophe north of Ontario.....	1
St. André lane east of St. André street.....	2
St. Mathew lane north and south of Ontario.....	2
St. Catherine street east of Darling.....	1
St. Constant street at Ontario.....	1
St. Pierre lane off Mignonne street.....	1
St. Julie lane off St. Denis	1

St. Roch street west of Poupart.....	1
Torrance street near Mountain.....	1
Victoria Square west side near St. James....	1
Woodyard lane south of Notre-Dame street.....	1
Wellington street west of toll gate.....	1
Workman street west limits.....	1

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It will be very important for the health of the people living in the districts where those dead ends are, that immediate means be taken to keep the water pure in the pipes.

Therefore I strongly recommend that all such pipes be extended and connected to the nearest street possible, and to put a hydrant on every end of those that cannot be thus connected. The hydrants would be sufficient to clear the water any time it is found necessary. We may have to change the position of some hydrants and that will cause some extra expense; but the importance of the case should rule all consideration.

HYDRANT REPAIRS &c.

One hundred and eighty hydrant valves were renewed. Two hundred and sixty-seven hydrants were reported frozen, seven hundred and ninety-one times during the winter 1888 and 1889.

All the hydrants on the line of the new laid main pipes were renewed.

The hydrants on Mill street were also renewed and three extra ones put in.

Five nozzle hydrants were placed in several parts of the City.

The number of five nozzle hydrants put in was.....	89
The number of two nozzle hydrants put in was.....	105
The number of patent hydrants in position up to January 1890 is (2 nozzle).....	455
Five nozzle hydrants now in position.....	153
Total number of patent hydrants in position.....	608

Schedule No. 6. Shows the number of new hydrants put in and also the repairs done to the old ones. It also shows, that twenty-one hydrants rods were broken and renewed and that one hundred and eighty-four leaks were repaired on the hydrants.

Five nozzle hydrants should be put in the following streets.

McGill and Recollet street.

Wellington and Murray.

Wellington and Mullins.

Ottawa and Young.

Notre-Dame and Dufresne.

St. Denis street opposite Deaf and Dumb Asylum, corner Roy.

Carleton Road opposite Reservoir valve house.

Ontario corner Bleury or opposite Plateau School.

St. Catherine street at Atwater Ave. square.

Dorchester and Guy opposite Grey-Nuns property.

Notre-Dame near "Ruisseau Migeon" opposite the Nun's property. The drinking tap on Commissioners street opposite the middle of Bonsecours Market, should be taken away and a horse trough and drinking tap put in its place.

Respectfully submitted,

Your obedient servant

CHAS LAGACÉ.

Foreman.

AQUEDUCT M. W. W.

ROCK GATES, JANUARY 15TH 1890.

B. D. McCONNEL Esq.,

Supt. M. W. W.

DEAR SIR,

The repairs done on the Aqueduct during the past year were as follows. The usual repairs to fences and approaches to bridges. A new bridge was made on Mrs. Greenshield's farm ; Crawford's, Crosse's, Mann's and Stephenson's Bridges, were jacked up and repaired, the cuts in the banks near the junction were filed up and repaired also the Banks were repaired and filed up on Aqueduct between Rock gates and stone bridge. The ditch along Brault's & Stephenson's farm was cleaned, the line ditch on Inland Cut along Parker's, Robert's and Dunn's farm was cleaned ; the Guardian's house was repaired, gravel roofed and painted, also the usual cutting of weeds.

The necessary repairs for the ensuing year will be a new bridge at Crawford's and Stephenson's farm, the crib work at Stephenson's and Crosse's bridges is very bad and will need to be rebuilt ; the regulating gates bridge on Inland Cut will need to be planked and Peniston's bridge will require planking and jacking up. the Culverts on Dunberry's road will need to be taken up and rebuilt. The banks on Inland cut south side between junction and regulating gates have to be repaired and some of the earth removed, as it is too high. There are several cuts in bank on Inland cut between regulating gates and entrance, which need filling up badly, the line ditch along the lane from Parker's will need to be cleaned, also berm ditches on Inland cut and berm ditches on old Aqueduct. The ditches from Culvert on both sides of Greenshield's and Crawford's farms to Guy's as they are complained of by Mr Crawford also Crawford's road will require repairing. The cap fence from line of Robert's fence also along Parker's road would need to be made into a picket fence and also the cap fence along McDonnel's and Sommerville's farms. The masonry on Culverts will need to be repaired and pointed also the usual repairs to fences and cutting of weeds.

The whole respectfully submitted.

I have the honor to be, dear Sir,

Your obedient servant,

EDWARD SALLEY,

Guardian of Aqueduct.

ANALYSIS OF WATER.

I the undersigned C. A. Pfister, chemist in Montreal, certify having examined and analysed 3 samples of water which have been sent to me in October last by Mr. J. O. A. Laforest deputy superintendent of Montreal Water Works.

Each sample was contained in 2 large bottles of a capacity of near 2 gallons each ; these bottles were numbered per couple A, B and C.

The physical and organoleptical characters of the samples are :

1° In common and at the arrival:—

Water uncolored, inodorous, fresh and agreeable taste, aerated (from 26 to 30 cubic centimetres of atmospheric gases or from 7.21 to 8.32 cubic inches per gallon).

Light matters in suspension but do not trouble the liquid.

2° After a month :—

The 3 samples. No disagreeable odor except what is called "odeur de renfermée" (the water was kept in corked bottles.)

But we can remark that :—

Water A tasted slightly unsavory. The sediments, brownish gray, pretty abundant on the bottom of the bottle, examined with the microscope abounds with microbial infusoria, bacteria, such as micrococcus, bacillæ and vibrio, etc., spombs.

Water B tasted more agreeable to drink than the preceding one. The sediments brownish white, examined with the microscope contains also organised matters but very little infusoria.

Water C slight taste, notably different from A. less agreeable than B, seems harder to the taste. The sediments which are whitish brown, if examined with the microscope are found more charged with infusoria than the preceding B, but less than A.

Summing up, the taste of B is the most agreeable after a month of sojourn in corked bottles.

THE ANALYSIS FURNISHED THE FOLLOWING RESULTS :

SAMPLE A.	Gram. per litre or prop. pr. 1000 of water in weight.	Grains per gallon.
The solid constituents simply dessicated at 100° C. or 212° F.....	0.0970	6.801
Carbonate of calcium.....	0.0377	2.643
“ magnesium.....	0.0080	0.561
Chloride of sodium.....	0.0035	0.245
Calcic sulfate.....	0.0282	1.977
Silica etc.....	0.0004	0.028
Whence, mineral matter.....	0.0778	5.455

SAMPLE B.		
The solid const. simply dess. at 100° C. or 212° F.....	0.0855	5.995
Calcic carbonate.....	0.0329	2.307
Magnesium.....	0.0140	0.982
Sodic chloride.....	0.0036	0.252
Sulfate of calcium.....	0.0238	1.669
Silica.....	0.0003	0.021
Whence, mineral matter.....	0.0746	5.231

SAMPLE C.		
The sol. const. simply dess. at 100° C. or 212° F.....	0.0985	6.906
Carbonate of Calcium.....	0.0371	2.601
“ “ Magnesium... ..	0.0123	0.862
Chloride of sodium.....	0.0036	0.252
Sulfate of calcium.....	0.0387	2.714
Silica acid and sand.....	0.0003	0.021
Whence, mineral weighed matter.....	0.0920	6.451

No apparent traces of ammonia, ammoniacal salts or nitrogenous matters in solution.

Traces of alumina and iron have been found in the 3 samples but in such a small quantity that it could not be appreciated. Same remark for potassium.

Conclusions.—The 3 samples considered as potable water are remarkable for the scarcity of mineral substances. None of them attaining the proportion of 0.1gr. per litre (7 grains per gallon) while the normal average of potable water is from 0.13gr. to 0.50gr. (9 to 35 grains per gallon.)

From another point of view these waters are excellent because of their low hydrotimetric degree which renders them suitable for dissolving soap etc.

Could be advantageously cleared, (specially the sample A,) of the organic matters in suspension.

If obtained from river, their composition necessarily varies with the falling of rain, melting of snow, the considerable changes in the temperature, consequently the seasons, their passage through cities, sojourn in reservoir, surface of contact etc.

Montreal, December 17th—89.

(signed)

C. A. PFISTER,

Professor of chemistry, Laval University, Faculty of arts—
Polytecnic school—Montreal college of Pharmacy.

N.B.	{	SAMPLE A—From High Level service, taken from corner of St. Dominique and Rachel streets.
J.O.A.L.	{	SAMPLE B—From Low Level service, taken from corner Notre-Dame and Canning streets.
	{	SAMPLE C—From St Cunegonde, taken from corner of Notre Dame street and Napoleon Road.

IMPROVEMENTS NEEDED.

MONTREAL, October 22nd 1889.

The Chairman and Members of the Water Committee.

GENTLEMEN,

I consider it my duty to draw your attention to certain matters, concerning the plant of the Water Works, which seem to require your consideration.

The first is, the condition of the Breast Wheel and the six bucket and plunger pumps. These you are aware have been in use since the existing system of works was inaugurated (upwards of 30 years ago) and as might be expected they show signs of decay. The pumps are much worn. The Breast Wheel is quite rickety, the arms and braces being loose in their sockets. A break down at any time would not be surprising. The wheel and pumps should be taken out and replaced by a turbine wheel and by pumps of the ordinary plunger type, set horizontally, on the floor, instead of in the pit. They should also be of greater capacity, say $\frac{1}{2}$ more, than the old pumps, as there are times when there is water power to spare, which might be utilized in this way, instead of being wasted, as with the present arrangement. These alterations would leave room in the building for another turbine and pumps.

The next point I would draw your attention to, is one on which I reported last February, viz; the fact that in case of the wheels being stopped for want of water power, the City would be dependent on two steam engines, neither of which singly is capable of furnishing the full supply, and either of which might require at any time, to stop for repairs. Last winter the water being very low in the Aqueduct, No. 1 Engine supplemented the supply from the wheels, working night and day, from 23rd February to 24th March. If this engine had become disabled, the other one could not have furnished the requisite quantity of water and there would have been a daily deficit of about 4 million gallons.

I may remind you that the Mayor in his inaugural address last March, referred very forcibly to the condition of things here alluded to, and recommended that prompt action should be taken to secure more pumping power. It seems therefore advisable, that unless the large aqueduct talked of, is to be speedily built, more steam power should be provided.

Where the Pavillon Road crosses the aqueduct, there is a stone bridge of two spans, the pier of which bridge, in the winter time, is a serious obstruction to the water way. It would be a great

improvement to remove the centre pier and put iron girders, from one abutment to the other.

The next matter I have to mention is the need of another lathe, at the workshop of the Wheel House. Both last year and this for want of another lathe, a great deal of work had to be given out, which might have been done on the premises, more cheaply and quite as well. I asked for this lathe, early last spring, and as it could not be got then, I consider it proper to remind your committee of the need there is of getting it as soon as possible,

Another feed pump, for No. 1 Engine is also desirable as a long run with the Engine might easily be interrupted, by the feed pump requiring re-packing or other repairs.

Coming now to the High Level Pumping station, I beg to remind you that here we have but one boiler. These works have now been carried on about 12 years with one boiler and have not, on that account, ever been obliged to stop pumping. That however is not an argument likely to convince any person, that it is safe to be without a second boiler and in fact, works for the supply of water to so important a City as Montreal, ought to be on a sufficiently liberal scale, to make their uninterrupted operation, beyond peradventure. I would therefore beg leave to suggest that a second boiler be added to the plant, at this station.

Should the foregoing suggestions, or any of them, meet the approval of your Committee, it would be advisable to have approximate estimates of cost made out, in order to ask council for the necessary funds.

I have the honor to be, Gentlemen,

Your obedient servant,

B. D. McCONNELL,

Supt. M. W. W.

No. 1.—SCHEDULE SHOWING THE WORK OF WHEEL No. 1 (TURBINE.)

MONTHS.	Time of pumping.		Revolutions.	Gallons pumped.	Pressure in air Vessel.	Castor oil.		Tallow.	Coal oil.	Cotton Waste.	Coal for heating.
	Hrs. M.										
1889.											
January.....	744.00		571,608	133,184,664	84	135.00	.....	.....	189.00	23.81	93160
February.....	633.50		411,994	95,994,602	80	112.50	36.00	.....	117.00	25.62	96180
March.....	633.00		203,005	47,300,165	69	83.25	10.00	.....	106.00	27.44	81140
April.....	709.20		557,208	129,829,464	88	135.00	.....	.....	146.00	26.25	53240
May.....	710.55		569,166	132,615,678	88	137.25	40.00	.....	144.00	26.50	7450
June.....	720.00		561,377	130,800,811	89	135.00	40.00	.....	125.00	26.44	.....
July.....	743.00		593,485	138,282,005	87	139.50	.....	.....	124.00	27.50	.....
August.....	703.35		536,375	124,975,375	84	135.60	50.00	.....	134.00	27.44	.....
September.....	720.00		509,856	118,796,448	87	153.00	40.00	.....	151.00	28.62	.....
October.....	744.00		515,511	120,114,063	86	139.50	.....	.....	186.00	24.62	52530
November.....	719.10		507,388	118,221,404	86	135.00	40.00	.....	182.00	26.50	73360
December.....	512.45		399,558	93,097,014	82	99.00	.....	.....	199.00	32.69	90070
Total.....	8293.35		5,936,531	1,383,211,723	.....	1,539.00	256.00	.....	1,803.00	323.43	547130
Average.....	.....		.....	.....	84	.....	.....	.....	.....	.....	.....
Last year.....	7585.35		5,703,351	1,328,881,482	.....	2,082.50	293.00	.....	1,709.00	307.79	492300

No. 2.—SCHEDULE showing the work of the Wheels No. 2 (Breast) and Nos. 3 & 4 (Turbines).

MONTHS.	Time of Pumping.			Revolutions.			Gallons pumped.	Pressure in air Vessel.			Castor oil.	Coal oil.	Cotton waste.
	Breast Wheel.	Turbine	Turbine	Breast Wheel.	Turbine.	Turbine.							
1889.	No. 2.	No. 3.	No. 4.	No. 2.	No. 3.	No. 4.	In pounds.	79	125,067,024	471,250	128.25	189.00	31.50
	Hrs. M.	Hrs. M.	Hrs. M.										
	703.30	.....	450.20	571,213	.....	471,250					
	.....	.....	339.10	.....	.....	376,742			
	76.30	.....	89.45	59,016	.....	110,618					
	717.10	526.45	621.15	589,484	382,899	756,687							
	699.20	738.40	739.00	579,325	551,777	919,100							
	720.00	720.00	720.00	600,308	561,275	911,708							
	744.00	734.00	742.50	611,572	542,255	881,544							
	689.40	694.50	702.50	534,036	490,970	839,623							
	719.00	717.00	720.00	512,674	480,192	865,621							
	688.50	368.10	744.00	479,661	242,920	941,184							
667.40	23.20	668.00	490,704	13,178	889,041								
696.30	270.00	692.25	535,661	196,095	966,841								
Total	7122.10	4792.45	7929.35	5,563,654	3,461,561	8,929,959	2,099,668,038	83	2,254.31	1,801.00	320.30		
Average	6457.20	4924.45	7572.30	4,918,108	3,422,936	8,820,465	1,933,047,827	2,374.12	1,709.00	324.27		

No 4.—SCHEDULE showing the work of steam engine No 3.

MONTHS.	Pump- ing time.	Revolu- tions.	Galls pumped	Coal used in pounds.		Average pressure on pump piston.	IN POUNDS.				Cotton waste.	
	Hrs. M.			For pumping.	For banking 1 000 000 fires. gallons.		Castor oil.	Cylin- der oil.	Seal oil.	Coal oil.		
1889.												
January.....	8.00	5,180	2,258,480	15,660	1,660	75	2.19	16.60			8.00	7.00
February.....												
March.....												
April.....												
May.....	84.3	539.19	24,380,684	126,050	20,410	75	15.75	80.00			8.00	12.25
June.....	44	291.66	12,716,376	68,440	9,000	75	6.75	40.00			8.00	18.00
July.....												
August.....	38.00	25,700	11,203,200	62,860	8,510	75	4.50	32.00				8.00
September.....	94.20	66,951	29,190,636	143,100	19,130	75	13.50	88.00			24.00	
October.....	81.20	53,352	23,697,472	114,350	15,340	75	11.25	64.00	8.87		16.00	10.00
November.....												
December.....	32.35	16,508	7,197,468	37,43	7,230	75	4.80	48.00	8.87		24.00	15.50
Total.....	382.50	253,776	110,646,336	567,890	81,280		58.44	368.00	17.74		88.00	60.75
Average.....						75						
Last year.....	2,815.30	1,746,381	761,422,116	4,078,240	348,650		278.00	1,722.63	230.18		808.00	179.25
Average.....						75						

No. 5.—SCHEDULE. Montreal Water Works, Low Level pumping station, Gallons pumped 1880.

MONTHS.	By Water Power.				By Steam Power.		Total for each month.			Percentage.		Average level of water.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By water.	By steam.	By water and by steam.	By water.	By steam.	
January	133,184,664	84,539,524	.....	40,527,500	86,055,751	2,258,480	258,251,684	88,314,230	346,565,918	74,529,548	38,113,360	66
February	95,994,602	.....	.....	32,399,812	193,628,050	.....	128,944,414	193,628,050	322,022,464	39,576,013	37,833,360	
March	47,300,165	8,734,368	.....	9,513,148	283,603,101	.....	65,547,681	2,536,033,100	319,150,781	18,778,123	37,653,360	
April	129,829,404	87,243,632	56,669,052	65,075,082	23,586,750	.....	338,817,230	23,586,750	362,403,980	93,499	6,513,907,370	
May	132,615,678	85,740,100	81,662,996	79,042,600	.....	24,380,684	379,061,374	24,380,684	403,442,038	93,955	6,053,991,372	
June	130,800,841	88,845,584	83,068,700	78,406,888	18,888,100	12,716,376	381,122,013	31,604,476	412,726,489	92,344	7,654,021,374	
July	138,282,005	90,512,656	80,233,740	75,812,784	43,930,150	11,203,200	384,861,185	43,930,150	428,791,335	99,761	10,243,967,378	
August	124,975,375	79,037,326	72,663,560	72,207,578	93,802,500	.....	348,883,841	105,007,700	453,891,541	76,863	13,387,336,58	
September	118,796,448	75,835,496	71,068,416	74,443,406	76,021,000	29,190,616	340,113,766	105,211,636	445,355,402	76,373	62,379,735,18	
October	120,114,063	70,989,828	35,952,160	80,941,824	80,401,200	23,697,472	307,997,875	101,098,672	412,096,547	74,745	25,267,375,35,24	
November	118,221,404	72,624,192	1,930,344	72,457,526	103,853,750	.....	265,253,466	103,853,750	369,107,216	71,877	28,137,403,550	
December	93,097,014	79,277,828	29,022,060	83,148,326	96,930,900	7,197,488	281,545,228	104,128,388	385,673,616	73,212	26,793,163,6,13	
Total	1,383,211,723	823,380,536	12,311,028	763,976,474	1,100,701,250	10,646,336	3,481,879,761	1,211,347,586	4,694,227,347	.....	.....
Average .....	.....	.....	.....	.....	.....	.....	9,542,136	3,318,761	12,860,897	74,192	3,813,523,36,32	

No. 6.—SCHEDULE showing the work of Engine No. 1 (Worthington) High Level Pumping station.

MONTHS.	Pump- ing time.	Revolu- tions.	Gallons pumped.	Coal used in pound,			Valvo-Cotton line. waste.
				For pump- ing.	For banking fires.	To raise 1,000,000 gallons.	
	Hrs. M.						IN POUNDS.
1889.							
January.....							
February.....							
March.....							
April.....							
May.....							
June.....							
July.....	34 30	89,453	1,073,436	5,579	1,010	6,134	4.00
August.....	22 00	39,023	468,276	3,002	655	7,801	4.00
September.....							
October.....							
November.....							
December.....							
Total.....	56 30	128,476	1,541,712	8,581	1,665		8.00
Average.....							
Last year.....						6,646	

No. 7.—SCHEDULE showing the work of Engine No. 2 (Gilbert's) High Level Pumping station.

MONTHS.	Time of Pumping.		Revolutions.	Gallons pumped.	Pressure in air vessel.	Coal used in pounds.				Cylinder oil lbs.	Cotton waste lbs.
	Hrs.	M.				For pumping	For banking fires.	To raise 1,000,000 gallons.	For heating.		
1889.											
January	82.15		167,904	8,081,745	110	22,396	8,757	3,840	5,007	95.00	25.
February	75.00		161,758	7,588,809	110	20,460	6,377	3,445	6,813	66.75	30.
March	75.55		164,581	7,924,739	110	19,478	6,430	3,268	6,543	66.50	30.
April	75.45		160,240	7,715,716	110	18,846	9,262	3,643	1,435	62.75	30.
May	105.00		221,214	10,651,675	110	26,685	9,476	3,394	.....	84.25	30.
June	125.30		269,492	12,976,309	115	32,590	8,279	3,150	.....	85.50	30.
July	103.00		217,481	10,471,927	118	28,123	7,512	3,403	.....	90.25	50.
August	116.15		255,678	12,311,151	118	33,574	7,962	3,374	.....	106.50	30.
September	117.55		259,288	12,484,976	120	35,575	8,510	3,531	.....	127.75	50.
October	115.45		241,720	11,602,560	119	35,299	8,400	3,766	1,017	100.00	50.
November	104.00		218,624	10,493,952	118	34,381	7,500	3,991	2,428	85.25	50.
December	112.30		257,713	12,370,224	117	41,295	8,345	4,013	3,670	101.25	50.
Total	1,208.50		2,595,693	124,876,783	.....	348,602	96,800	.....	26,913	1,066.75	455.00
Average .....	.....		.....	.....	115	.....	.....	3,567	.....	.....	.....

No. 8. —Schedule showing the depth of water, the rain fall and the average temperature at 9 a. m. at McTavish street Reservoir.

MONTHS.	Average monthly depth in feet.	Rain gauges in inches.				Average temperature at 9 a.m.
		Rain.	Snow.	Snow reduced to rain.	Total rain.	
1889						
January	22.76	1.14	35.75	3.99	5.13	23.16
February	22.34	0.30	24.75	2.62	2.92	12.71
March	22.62	0.84	13.50	1.44	2.28	30.45
April	22.32	2.05	.....	.....	2.05	47.57
May	21.74	2.44	.....	.....	2.44	58.13
June	21.31	4.37	.....	.....	4.37	59.93
July	18.40	6.68	.....	.....	6.68	63.45
August	17.93	2.10	.....	.....	2.10	65.26
September	22.19	5.14	.....	.....	5.14	59.87
October	22.38	3.42	.....	.....	3.42	42.97
November	22.19	1.57	16.00	1.09	2.66	36.83
December .....	.....	4.32	11.00	1.81	6.13	23.97
Total .....	.....	34.37	101.00	10.95	45.32	43.69
Last year .....	.....	26.70	103.00	10.45	37.15	39.40

SCHEDULE No. 9.

Repairs to mains, hydrants and valves, during the year 1889.

DESCRIPTION.	12"	10"	8"	6"	4"	Hydrant valves renewed.	Hydrants replaced by non-freezing hydrants.	Hydrants replaced.	Hydrant rods broken.
Mains broken	5	1	.....	6	12				
Joints blown out.....	13	8	2	21	41				
Stop-valves renewed.....	1	2	1	9	14				
Valve Spindles renewed.....				2	2				
						180	2	2	21

Repairs &c , to service.

Leaking over drains.	Couplings leaking.	Burst in wall.	Cocks renewed.	Wooden boxes replaced by iron ones.	Pipes choked.	Old kind cocks replaced by pneumatic valve.
25	53	43	27	448	63	60

Service pipes reported broken.

Pipes frozen inside.	Pipes frozen in wall.	False reports investigated.	Leak on services from various causes undefined.
51	77	20	824

Hydrants frozen during winter commencing Dec. 1889 ending April 1890.

January.	February.	March.	Total.
82	647	62	Hydrants reported frozen 791 times. 267

New hydrants (old pattern) put in during year 1889 (new work)..... 2
 New hydrants put in during year 1889 (5 nozzle) 89
 New patent hydrants (2 nozzle) put in during year 1889 (new work). 105
 New patent hydrants in position up to January 1890 (2 nozzle)..... 455
 New patent hydrants in position up to January 1890 (5 nozzle)..... 153
 " Pneumatic " valves put in during year 1889 (new work)..... 2828
 Pneumatic cocks put in up to January 1890 new work and repairs..10255

No. 10.—Comparative table showing the average daily consumption for each month and for each year from 1879 to 1889 in the City of Montreal.

MONTHS.	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
January	8,711,520	8,675,067	9,548,641	8,269,612	10,575,363	9,824,502	10,970,751	12,751,651	11,932,374	2,562,557	11,179,565
February	8,825,552	8,897,987	9,126,557	8,669,932	10,745,981	9,882,102	11,674,832	12,570,484	11,917,239	3,259,361	11,800,802
March	9,082,027	9,430,162	9,009,369	9,028,616	10,531,461	9,881,169	11,224,375	12,195,761	12,249,017	4,035,641	11,962,928
April	9,198,983	9,098,494	9,147,791	9,024,754	10,356,518	10,630,651	11,542,215	12,806,662	12,305,894	3,262,806	12,080,192
May	9,279,565	9,132,068	9,058,872	8,915,219	9,626,842	10,640,086	11,856,877	12,554,388	13,137,236	3,332,800	12,014,250
June	9,487,630	10,238,392	9,674,104	9,386,071	10,566,558	10,885,666	11,882,888	12,982,829	13,835,448	4,150,814	13,757,540
July	10,025,080	10,574,083	10,423,208	10,305,110	11,299,201	11,895,114	12,716,836	13,595,315	15,463,156	5,459,561	13,831,978
August	10,312,223	11,097,648	10,548,459	10,811,241	11,374,208	11,827,670	12,777,687	13,548,242	14,915,013	2,239,071	14,641,062
September	9,753,752	10,720,280	10,981,133	10,787,854	11,438,378	11,656,141	11,750,266	13,543,309	13,665,962	3,633,784	14,845,801
October	9,034,211	10,131,764	10,285,651	10,015,944	11,101,760	11,048,723	12,434,970	12,498,404	12,868,967	13,025,260	13,993,437
November	8,270,213	9,230,560	9,093,571	9,796,205	10,091,780	10,343,286	12,405,337	11,181,895	12,983,318	12,413,281	12,303,573
December	8,169,285	9,046,544	8,350,180	9,727,240	9,331,761	10,301,871	12,283,395	11,477,885	11,300,324	11,717,791	12,537,898
Daily average for each year.	9,177,504	9,691,901	9,606,295	9,566,759	10,552,174	10,687,037	11,970,504	12,642,957	13,054,906	13,420,310	12,860,897
Increase over preceding year.	86,373	514,497	.....	.....	985,411	134,863	1,283,467	672,453	411,949	287,021	559,413
Decrease from	.....	.....	85,606	39,536	.....	.....	.....	.....	.....	.....	.....

No. 11.—SCHEDULE showing the different kinds and sizes of Meters belonging to the City and to private parties.

KINDS.	Sizes in inches.	Property of the City.				Private Property.				Grand total.
		In the City.	Outside the City.	At the work shop.	Total.	In the City.	Outside the City.	At the work shop.	Total.	
Gem.....	10	.....	.....	2	2	.....	.....	.....	.....	2
"	6	4	1	1	6	4	.....	.....	4	10
"	4	20	.....	4	24	3	.....	.....	3	27
"	3	63	.....	4	67	9	.....	1	10	77
"	2	29	.....	4	33	5	.....	4	9	42
"	1 1/2	8	.....	4	12	4	.....	1	5	17
"	1	.....	.....	7	7	.....	.....	.....	.....	7
"	1	1	.....	11	12	.....	.....	2	2	14
"	3/4	.....	.....	74	74	.....	.....	2	2	76
Union.....	3	.....	.....	1	1	.....	.....	.....	.....	1
"	2	.....	.....	2	2	1	.....	.....	1	3
"	1	23	.....	1	24	1	.....	.....	1	25
"	1/2	66	.....	.....	66	3	.....	.....	3	69
Rotary Union.....	4	.....	.....	2	2	.....	.....	.....	.....	2
"	3	.....	.....	1	1	.....	.....	1	1	2
"	2	.....	.....	2	2	.....	.....	.....	.....	2
"	1 1/2	2	.....	3	5	.....	.....	.....	.....	5
"	1	.....	.....	3	3	.....	.....	.....	.....	3
"	3/4	.....	.....	14	14	.....	.....	.....	.....	14
"	.....	.....	.....	3	3	.....	.....	.....	.....	3
Crown.....	6	1	.....	.....	1	1	1	.....	2	3
"	4	8	1	.....	9	2	.....	.....	2	11
"	3	5	1	.....	6	2	.....	.....	2	8
"	2	12	3	.....	15	3	.....	.....	3	18
"	1 1/2	14	.....	1	15	1	.....	.....	1	16
"	1	35	1	3	39	.....	.....	.....	.....	39
"	1	39	.....	9	48	1	.....	.....	1	49
"	1	76	1	11	88	2	4	.....	6	94
"	.....	.....	.....	3	3	.....	.....	.....	.....	3
Empire.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2
"	1	15	.....	1	16	.....	.....	.....	.....	16
"	3	.....	.....	.....	3	.....	.....	.....	.....	3
"	4 1/2	43	.....	7	50	.....	.....	.....	.....	50
Worthington.....	4	.....	.....	.....	.....	1	.....	.....	1	1
"	3	1	.....	1	2	.....	.....	.....	.....	2
"	2	11	.....	.....	11	5	.....	.....	5	16
"	1 1/2	14	.....	.....	14	1	.....	.....	1	15
"	1	44	1	3	48	.....	.....	.....	.....	48
"	1	59	.....	9	68	5	.....	3	8	76
Bersey.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Continental.....	2	.....	.....	4	6	.....	.....	.....	.....	6
Siemens.....	2	.....	.....	1	1	.....	.....	.....	.....	1
"	1	.....	.....	1	1	.....	.....	.....	.....	1
Endine.....	3	.....	.....	1	1	.....	.....	.....	.....	1
Lewis.....	1	.....	.....	1	1	.....	.....	.....	.....	1
Equitable.....	1	.....	.....	.....	.....	1	.....	.....	1	1
"	.....	.....	.....	1	1	.....	.....	.....	.....	1
Sportous.....	1	.....	.....	1	1	.....	.....	.....	.....	1
Maxime.....	1	.....	.....	.....	.....	.....	.....	1	1	1
Total.....		601	9	201	811	55	5	15	75	886

No. 2—SCHEDULE showing the work of the Wheels No. 2 (Breast) and Nos. 3 & 4 (Turbines).

MONTHS.	Time of Pumping.				Revolutions.			Gallons pumped.	Pressure in air Vessel.	Castor oil.	Coal oil.	Cotton waste.
	Breast Wheel.	Turbine.	Turbine.		Breast Wheel.	Turbine.	Turbine.			In pounds.		
	No. 2.	No. 3.	No. 4.		No. 2.	No. 3.	No. 4.					
1889.	Hrs. M.	Hrs. M.	Hrs. M.									
January	703.30	.....	450.20	.....	571,913	.....	471,250	125,067,024	79	128.25	189.00	31.50
February	76.30	.....	339.10	.....	.....	.....	376,742	32,399,812	80	45.31	117.00	15.00
March	717.10	526.45	.....	.....	59,016	.....	110,618	18,247,516	82	27.00	106.00	18.00
April	699.20	738.40	739.00	.....	589,484	387,899	756,687	208,987,766	84	229.00	146.00	26.56
May	720.00	720.00	720.00	.....	579,325	551,777	919,100	246,445,696	84	265.50	144.00	27.00
June	744.00	734.00	742.50	.....	600,308	561,275	911,708	250,321,172	85	167.75	125.00	29.56
July	689.40	694.50	702.50	.....	611,572	542,355	881,544	246,579,180	84	279.00	124.00	29.50
August	719.00	717.00	720.00	.....	534,036	490,970	839,623	223,908,466	84	261.00	134.00	33.62
September	688.50	368.10	744.00	.....	512,674	480,192	865,621	221,347,318	85	283.00	151.00	30.69
October	667.40	23.20	668.00	.....	479,661	242,930	941,184	187,883,812	85	219.37	186.00	29.87
November	696.30	270.00	692.25	.....	490,704	13,178	889,041	147,032,062	85	155.63	180.00	22.25
December .....	.....	.....	.....	.....	535,661	196,095	966,841	191,448,214	84	193.50	199.00	26.75
Total	7122.10	4792.45	7229.35	.....	5,563,654	3,461,561	8,929,959	2,099,668,038	83	2,254.31	1,801.00	320.30
Average.... last year....	6457.20	4924.45	7572.30	.....	4,918,198	3,422,936	8,820,465	1,933,047,827	.....	2,374.12	1,709.00	324.27

No. 3.—SCHEDULE showing the work of steam engine No. 1

MONTHS.	Pumping time.		Revolutions.	Gallons pumped.	Coal used in pounds.			Pressure in air vessel.	Cast'g oil.	Cylinder oil.	Seal oil.	Coal oil.	Cott'n Waste
	Hrs	M.			For Pumping.	For Banking fire.	To raise 1 000 000 gallons.						
1889													
January	207.40		156,465	86 055,750	288,950	41,870	3,844	82	72.00	176.00	28.00	120.00	12.00
February	417.00		352,051	193,628,050	709,520	32,630	3,832	84	159.00	432.00	75.00	224.00	32.75
March	644.31		515,642	283,603,100	999,700	12,960	3,570	85	156.00	376.00	81.00	304.00	15.31
April	63.36		42,885	23,586,750	76,130	11,030	3,694	78	15.00	48.00	....	24.00	12.63
May .....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	52.20		34,342	18,888,100	67,180	7,710	3,964	79	18.00	56.00	8.00	16.00	12.00
July	104.45		79,873	43,930,150	165,780	14,310	4,099	83	42.75	88.00	16.00	16.00	15.44
August	215.15		170,550	93,802,500	338,760	23,860	3,843	85	81.00	168.00	18.25	16.00	12.56
September	171.42		138,320	76,021,000	264,030	34,500	3,926	85	67.31	184.00	8.87	32.00	10.00
October	180.10		146,184	80,401,200	274,620	39,790	3,910	85	83.25	176.00	26.63	40.00	12.00
November	250.10		188,825	103,853,750	356,190	46,620	3,878	84	99.00	288.00	27.50	56.00	20.00
December	208.10		176,238	96,930,900	326,020	45,060	3,828	85	103.50	240.30	44.37	80.00	15.44
Total	2515.20		2,001,275	1,100,701,250	3,866,890	310,330	.....	.....	896.81	2,232.00	333.62	928.00	170.13
Average .....	.....		.....	.....	.....	.....	3,795	83	.....	.....	.....	.....	.....
Last year	2,271.00		1,507,407	839,073,850	3,267,720	118,230	.....	.....	322.00	1,102.12	189.12	808.00	149.81
Average .....	.....		.....	.....	.....	.....	4,083	.....	.....	.....	.....	.....	.....

No 4.—SCHEDULE showing the work of steam engine No 3.

MONTHS.	Pump- ing time.		Revolu- tions.	Galls pumped	Coal used in pounds.			Average pressure on pump piston.	In pounds.				(Cotton waste)
	Hrs.	M.			For pumping.	For banking fires.	To raise 1 000 000 gallons.		Castor oil.	Cylin- der oil.	Seal oil.	Coal oil.	
1889.													
January	8.00		5,180	2,258,480	15,660	1,660	.....	75	2.19	16.60	.....	8.00	7.00
February .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	84.3		539.19	24,380,684	126,050	20,410	6,131	75	15.75	80.00	.....	8.00	12.25
June	44		291.66	12,716,376	68,440	9,000	6,089	75	6.75	40.00	.....	8.00	18.00
July .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August	38.00		25,700	11,205,200	62,860	8,510	6,369	75	4.50	32.00	.....	.....	8.00
September	94.20		66,951	29,190,636	143,100	19,130	5,557	75	13.50	88.00	.....	24.00	.....
October	81.20		54,352	23,697,472	114,350	15,340	5,472	75	11.25	64.00	8.87	16.00	10.00
November .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
December	32.35		16,508	7,197,488	37,43	7,230	6,219	75	4.80	48.00	8.87	24.00	15.50
Total	382.30		253,776	110,646,336	567,890	81,280	.....	.....	58.44	368.00	17.74	88.00	60.75
Average .....			.....	.....	.....	.....	5,867	75	278.00	1,722.62	230	18,808.00	179.25
Last year	2,815.30		1,746,381	761,422,116	4,078,240	348,650	5,814	75	.....	.....	.....	.....	.....
Average .....			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

No. 5.—*SCHEDULE.* Montreal Water Works, Low Level pumping station, Gallons pumped 1889.

MONTHS.	By Water Power.				By Steam Power.		Total for each month.			Percentage.		Average level of water.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By water.	By steam.	By water and by steam.	By water.	By steam.	
January....	133,184,664	84,539,524	.....	40,527,500	86,055,751	2,258,480	258,251,688	88,314,230	346,565,918	74,529,254	38,113,600	.....
February....	95,991,602	.....	.....	32,399,812	193,628,050	.....	128,944,414	193,628,050	322,022,464	39,876,013	37,833,600	.....
March.....	47,300,165	8,734,368	.....	9,513,148	283,603,101	.....	65,547,681	2,360,310	319,150,781	18,778,123	37,653,600	.....
April.....	129,829,484	87,243,632	56,669,052	65,075,082	23,586,750	.....	338,817,230	23,586,750	362,403,980	93,449	6,513,903	37,08
May.....	132,615,678	85,740,100	81,662,996	79,042,600	.....	24,380,684	379,081,374	24,380,684	403,442,058	93,955	6,053,991	37,28
June.....	130,800,841	88,845,584	83,068,700	78,406,888	18,888,100	12,716,376	381,192,013	31,604,476	412,726,489	92,344	7,654,021	37,48
July.....	138,282,005	90,512,656	80,233,740	75,812,784	43,930,150	.....	384,861,185	43,930,150	428,791,335	89,761	10,243,967	37,88
August.....	124,973,375	79,037,328	72,663,560	72,207,578	93,802,500	11,203,900	348,883,841	105,211,636	453,891,541	76,862,313	38,733,658	.....
September....	118,796,448	75,835,496	71,068,416	74,443,406	76,021,000	29,190,616	340,113,766	105,211,636	445,355,402	76,372,623	37,973,518	.....
October.....	120,114,063	70,989,828	35,952,160	80,941,824	80,401,203	23,697,472	307,997,875	104,098,672	412,096,547	74,745,256	26,373,352	.....
November.....	118,221,404	72,624,192	1,930,344	72,457,526	103,853,750	.....	265,253,466	103,853,750	369,107,216	71,879,281	37,403,550	.....
December.....	93,097,014	79,277,828	29,032,060	83,148,326	96,930,900	7,197,488	281,545,228	104,128,388	388,673,616	73,212,679	38,163,613	.....
Total.....	1,383,211,723	823,380,536	512,311,028	763,976,474	1,100,701,250	10,646,336	3,481,879,761	1,211,347,586	4,694,227,347	.....	.....	.....
Average.....	.....	.....	.....	.....	.....	.....	9,542,136	3,318,761	12,860,897	74,192,581	38,523,632	.....

No. 7.—SCHEDULE showing the work of Engine No. 2 (Gilbert's) High Level Pumping station.

MONTHS.	Time of Pumping.		Revolutions.	Gallons pumped.	Pressure in air vessel.	Coal used in pounds.				Cylinder oil lbs.	Cotton waste lbs.
	Hrs.	M.				For pumping.	For banking fires.	To raise 1,000,000 gallons.	For heating.		
1889.											
January	82.15		167,904	8,084,745	110	22,296	8,757	3,840	5,007	95.00	25.
February	75.00		161,758	7,788,809	110	20,460	6,377	3,445	6,813	66.75	30.
March	75.55		164,581	7,924,739	110	19,478	6,420	3,268	6,543	66.50	30.
April	75.45		160,240	7,715,716	110	18,846	9,262	3,643	1,435	62.75	30.
May	105.00		221,214	10,651,675	110	26,685	9,476	3,394	.....	84.25	30.
June	125.30		269,492	12,976,309	115	32,590	8,279	3,150	.....	85.50	30.
July	103.00		217,481	10,471,927	118	28,123	7,512	3,403	.....	90.25	50.
August	116.15		255,678	12,311,151	118	33,574	7,962	3,374	.....	106.50	30.
September	117.55		259,288	12,484,976	120	35,575	8,510	3,531	.....	122.75	50.
October	115.45		241,720	11,002,560	119	35,299	8,400	3,766	1,017	100.00	50.
November	104.00		218,624	10,493,952	118	34,381	7,500	3,991	2,428	85.25	50.
December	112.30		257,713	12,370,224	117	41,295	8,345	4,013	3,670	101.25	50.
Total	1,208.50		2,595,693	124,876,783	.....	348,002	96,800	.....	26,913	1,066.75	455.00
Average .....	.....		.....	.....	115	.....	.....	3,567	.....	.....	.....

Schedule showing the Pipes, &c.—Continued.

NAMES OF STREETS.	Lenght in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass Cocks.	Air Cocks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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No. 11.—SCHEDULE showing the different kinds and sizes of Meters belonging to the City and to private parties.

KINDS.	Sizes in inches.	Property of the City.				Private Property.				Grand total.
		In the City.	Outside the City.	At the work shop.	Total.	In the City.	Outside the City.	At the work shop.	Total.	
Gem.....	10	.....	.....	2	2	.....	.....	.....	.....	2
".....	6	4	1	1	6	4	.....	.....	4	10
".....	4	20	.....	4	24	3	.....	.....	3	27
".....	3	63	.....	4	67	9	.....	1	10	77
".....	2	29	.....	4	33	5	.....	4	9	42
".....	1 1/2	8	.....	4	12	4	.....	1	5	17
".....	1	.....	.....	7	7	.....	.....	.....	.....	7
".....	3/4	1	.....	11	12	.....	.....	2	2	14
".....	1/2	.....	.....	74	74	.....	.....	2	2	76
Union.....	3	.....	.....	1	1	.....	.....	.....	.....	1
".....	2	.....	.....	2	2	1	.....	.....	1	3
".....	1	23	.....	1	24	1	.....	.....	1	25
".....	3/8	66	.....	.....	66	3	.....	.....	3	69
Rotary Union.....	4	.....	.....	2	2	.....	.....	.....	.....	2
".....	3	.....	.....	1	1	.....	.....	1	1	2
".....	2	.....	.....	2	2	.....	.....	.....	.....	2
".....	1 1/2	2	.....	3	5	.....	.....	.....	.....	5
".....	1	.....	.....	3	3	.....	.....	.....	.....	3
".....	3/4	.....	.....	14	14	.....	.....	.....	.....	14
".....	1/2	.....	.....	3	3	.....	.....	.....	.....	3
Crown.....	6	1	.....	.....	1	1	1	.....	2	3
".....	4	8	1	.....	9	2	.....	.....	2	11
".....	3	5	1	.....	6	2	.....	.....	2	8
".....	2	12	3	.....	15	3	.....	.....	3	18
".....	1 1/2	14	.....	1	15	1	.....	.....	1	16
".....	1	35	1	3	39	.....	.....	.....	.....	39
".....	3/4	39	.....	9	48	1	.....	.....	1	49
".....	1/2	76	1	11	88	2	4	.....	6	94
".....	3/8	.....	.....	3	3	.....	.....	.....	.....	3
Empire.....	2	.....	.....	2	2	.....	.....	.....	.....	2
".....	1	15	.....	1	16	.....	.....	.....	.....	16
".....	3/4	3	.....	.....	3	.....	.....	.....	.....	3
".....	1/2	43	.....	7	50	.....	.....	.....	.....	50
Worthington.....	4	.....	.....	.....	.....	1	.....	.....	1	1
".....	3	1	.....	1	2	.....	.....	.....	.....	2
".....	2	11	.....	.....	11	5	.....	.....	5	16
".....	1 1/2	14	.....	.....	14	1	.....	.....	1	15
".....	1	44	1	3	48	.....	.....	.....	.....	48
".....	3/4	59	.....	9	68	5	.....	3	8	76
Hersey.....	1	.....	.....	.....	1	.....	.....	.....	.....	1
Continental.....	2	.....	.....	4	6	.....	.....	.....	.....	6
Siemens.....	2	.....	.....	1	1	.....	.....	.....	.....	1
".....	1	.....	.....	1	1	.....	.....	.....	.....	1
Undine.....	1	.....	.....	1	1	.....	.....	.....	.....	1
Lewis.....	1	.....	.....	1	1	.....	.....	.....	.....	1
Equitable.....	1	.....	.....	.....	.....	1	.....	.....	1	1
".....	1	.....	.....	1	1	.....	.....	.....	.....	1
Sportous.....	1	.....	.....	1	1	.....	.....	.....	.....	1
Maxime.....	1	.....	.....	.....	.....	.....	.....	1	1	1
Total.....		601	9	201	811	55	5	15	75	886

ST. LAWRENCE WARD—	St. Lawrence street,	75 feet of 6 in. and	70 feet of 4 in.
ST. JAMES WARD—	St. Catherine street,	190 do of 6 in. and	70 do of 4 in.
ST. MARY'S WARD—	do	130 do of 4 in.	
do	Visitation street,	340 do of 6 in.	

Making a total of 6445 of 6 in. and 2905 of 4 inch, to be deducted from the quantities in schedule No. 13; as also must be the following lengths of mains which were left in the ground in 1888 and of which no note was made in the report for that year, viz:—

ST. LOUIS WARD—	Craig street,	1650 feet of 8 in. main,	40 feet of 4 in.
ST. JAMES WARD—	do	2460 do. of 6 in. do.	60 do. do.
ST. MARY WARD—	do	1350 do. of 6 in. do.	60 do. do.
ST. LAWRENCE WARD—	do	1840 do. of 8 in. do.	50 do. do.
ST. ANTOINE WARD—	do	771 do. of 8 in. do.	179 do. of 6 in. and 30 of 4 in.
HOHELAGA WARD—	Dezery street,	2100 do. of 6 in. were taken up.	Amounting to 10,590 feet of pipe.

In all to be deducted for pipes taken out or abandoned in the ground in 1888 and 1889, and not heretofore recorded 19,040 feet or 3.77 miles.

Schedule showing the Pipes, &c.—Continued.

NAMES OF STREETS.	Length in feet of cast iron pipes.								No. of Valves.										Wrought Iron Pipes.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass Cocks.	Air Cocks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Schedule showing the Pipes, &c.—Continued.

NAMES OF STREETS.	Length in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass Cocks.	Air Cocks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Schedule showing the Pipes, &c.—Continued.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants	Length of Laid Pipes in feet.	Houses Supplied.	Bras Cocks.	Air Cocks.						
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.												
<i>St. Gabriel Ward.—Con.</i>																																
Brought forw'd	901	12	913	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	1556	79	.....	75	.....	.....	.....	.....	.....
Hilernian Road	64	4	.....	4	.....	.....	.....	.....	.....
Coleraine	49	4	.....	4	.....	.....	.....	.....	.....
Atwater Ave...	274	.....	.....	.....	.....	.....	.....	.....	21	2763	4	.....	.....	.....	.....	.....	.....	.....	4	8	.....	.....	.....	28	1	.....	1	.....	.....	.....	.....	.....
Ropery	26	1	.....	1	.....	.....	.....	.....	.....
Favard	93	2	.....	2	.....	.....	.....	.....	.....
Bourgeois	429	16	.....	16	.....	.....	.....	.....	.....
Grand Trunk	151	7	.....	7	.....	.....	.....	.....	.....
Rushbrook
Charron	351	10	361	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	515	24	.....	26	.....	.....	.....	.....	.....
Wellington	55	1	.....	1	.....	.....	.....	.....	.....
Napoleon Road	62	3	.....	3	.....	.....	.....	.....	.....
Knox	6	19	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	365	17	.....	17	.....	.....	.....	.....	.....
Center	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	640	21	.....	28	.....	.....	.....	.....	.....
Manufacturers
St. Patrick
Edinburg
Total.....	2742	1105	.....	.....	.....	26	51	130	229	454	4	1	.....	.....	.....	.....	.....	.....	6	12	.....	.....	.....	4357	20	.....	200	.....	.....	.....	.....	.....

ST. LAWRENCE WARD—	St. Lawrence street,	75 feet of 6 in. and 70 feet of 4 in.
ST. JAMES WARD—	St. Catherine street,	190 do of 6 in. and 70 do of 4 in.
ST. MARY'S WARD—	do	130 do of 4 in.
do	Visitation street,	340 do of 6 in.

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ST. JAMES WARD—	do	2460 do. of 6 in. do. 60 do. do.
ST. MARY WARD—	do	1350 do. of 6 in. do. 60 do. do.
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HOCHELAGA WARD—	Dezery street,	2100 do. of 6 in. were taken up. Amounting to 10,590 feet of pipe.

In all to be deducted for pipes taken out or abandoned in the ground in 1888 and 1889, and not heretofore recorded 19,940 feet or 3.77 miles.

Schedule No. 13, showing the Pipes, Hydrants and Valves laid down and the number of Houses supplied with water in the City of Montreal up to 1st January 1890.

WARDS.	MAIN PIPES.												Lead Pipes.	VALVES.												HY-DRANTS.		SERVICES.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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	30"	24"	20"	16"	12"	10"	8"	6"	4"	3"	1 1/2"	Total.			30"	24"	20"	16"	12"	10"	8"	6"	4"	3"	2 1/2"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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No. 14.—Schedule showing the average pressure in the City Mains during the year 1889.

MONTHS.	At W. Work Shop, Lagauchetière St., cor. St. Chas-Borée.	Central Fire Station, Craig street.	Fire Station No. 2 St. Gabriel street.	Fire Station No. 3 Wellington street.	Fire Station No. 4 Chaboulièz square.	Fire Station No. 5 St. Catherine street.	Fire Station No. 6 Ontario street.	Fire Station No. 7 Dalhousie Square.	Fire Station No. 8 Craig street.	Fire Station No. 9 Centre street.	Fire Station No. 10 St. Catherine street.	Fire Station No. 11 Ontario street.	Fire Station No. 12 Seigneurs street.	Fire Station No. 13 Desery street.	Fire Station No. 14. St. Dominique st.	Fire Station No. 15 Island street St. Gabriel Ward.	Average surface of water in McTavish Reservoir.
1889	42.06	32.00	57.00	27.00	.....	97.06	65.00	70.56	43.00	26.04	130.00	70.00	36.00	44.00	.....	.....	205.00
January.....	65.00	72.00	69.00	77.00	79.00	45.00	65.00	59.00	71.00	72.00	30.00	67.00	77.00	69.00	106.00	70.00	204.76
February.....	65.00	72.00	67.00	77.00	78.00	45.00	65.00	60.00	71.00	73.00	30.00	69.00	72.00	69.00	106.00	70.00	204.34
March.....	65.00	72.00	66.00	79.00	79.00	45.06	65.00	60.00	71.00	75.00	30.00	66.00	72.00	69.00	106.00	70.00	204.62
April.....	65.00	72.00	67.00	79.00	79.00	45.06	65.00	60.00	71.00	75.00	30.00	66.00	72.00	69.00	107.00	70.00	204.32
May.....	65.00	72.00	72.00	79.00	78.00	45.00	65.00	.....	71.00	75.00	30.00	66.00	70.00	69.00	106.00	70.00	203.71
June.....	65.00	72.00	70.00	79.00	79.00	45.00	.....	.....	.....	75.00	30.00	66.00	77.00	70.00	105.00	72.00	203.31
July.....	65.00	72.00	70.00	79.00	79.00	40.00	.....	.....	.....	75.00	30.00	68.00	72.00	69.00	113.00	72.00	200.40
August.....	65.00	72.00	67.00	79.00	79.00	40.00	.....	.....	.....	75.00	30.00	67.00	72.00	69.00	111.00	72.00	199.93
September.....	65.00	72.00	72.00	79.00	78.00	40.00	65.00	.....	71.00	72.00	30.00	68.00	72.00	69.00	109.00	70.00	204.19
October.....	65.00	72.00	70.00	77.00	77.00	42.00	65.00	59.00	71.00	72.00	30.00	66.00	72.00	69.00	111.00	70.00	204.38
November.....	65.00	72.00	70.00	79.00	78.00	42.00	65.00	53.00	71.00	72.00	30.00	66.00	72.00	69.00	109.00	71.00	204.19
December.....	65.00	72.00	72.00	78.00	76.00	42.00	65.00	55.00	71.00	72.00	30.00	67.00	72.00	69.00	109.00	75.00	201.45
Avg'e 1889	65.00	72.00	68.83	78.40	78.27	43.00	65.00	57.17	71.01	73.58	30.00	66.83	71.83	69.08	108.16	71.00	203.55
" 1888	65.00	72.25	61.57	77.91	76.66	45.00	65.00	57.83	70.92	70.09	30.00	66.09	72.00	69.83	.....	70.16	204.01

**No. 15.—SCHEDULE showing the position of Public Fountains erected in the
City of Montreal, up to January 1890.**

Nos.	LOCATION.	Cast Iron Basins.	Stone & Cement Basins.	Stone fountains.	Cast iron fountains.	Wood fountains.	Cast iron cattle trink'g troughs	Number of jets.
1	Beaver Hall Square.....				1			1
2	Bellerive Park.....	1			1			2
3	Bleury & Dorchester.....			1				1
4	Bonsecours Market.....							2
5	Chaboillez Square.....						1	1
6	Cherrier Square.....				1			5
7	Colborne at Flour Sheds.....				1		1	2
8	Court House Square.....	2	1	2				5
9	Craig at Victoria Square..			1				2
10	Craig opposite Drill Hall..				1		1	1
11	Custom House Square.....				1		1	1
12	Dorchester and Dominion Square..				1		1	1
13	Dufferin Square.....				1			1
14	Fulford near Notre Dame.....				1		1	1
15	Guilbault and St. Lawrence.....				1		1	1
16	Jacques Cartier Square and St. Paul.....	1			1		1	5
17	Inspector, at Hay Market.....						1	1
18	McTavish Street, opposite Reservoir.....				1			1
19	McGill and Commou.....			1			1	2
20	Mill Street, at Waste Weir.....					1	1	2
21	Moreau, near Notre Dame.....						1	1
22	Notre Dame and Susanne.....				1		1	1
23	Ontario and St. Denis.....					1	1	2
24	Ontario and Champlain.....					1	1	2
25	Papineau Square.....					1	1	2
26	Park Avenue and St. Jean-Baptiste.....				1		1	1
27	Phillips Square.....				1			1
28	Phillips Square and St. Catherine.....						1	1
29	Place D'Armes.....	2	1					5
30	Prince and Common.....				1		1	2
31	Rachel and Champlain.....				1		1	1
32	Richmond Square.....				1		1	1
33	Seigneurs and William.....				1		1	1
34	Sherbrooke, near Drummond.....					1	1	2
35	Sherbrooke, corner Guy.....					1	1	1
36	St. Ann's Market.....					2		2
37	St. Antoine Market.....				1		1	2
38	St. Catherine and Delorimier.....					1	1	2
39	St. Gabriel Market.....					1	1	2
40	St. Louis Square.....	1			2			7
41	St. Patrick Square.....	1			1			2
42	St. Patrick and Richmond.....				1		1	1
43	St. Patrick and Napoleon.....				1		1	1
44	St. Thomas and Ottawa.....				1		1	2
45	Victoria Square, South of Craig.....		1	2				7
46	Victoria Square, North of Craig.....	3						4
47	Viger Square Basin No. 1.....		1					1
48	Viger Square Basin No. 2.....	3						9
49	Viger Square.....			1	1			2
50	Viger Market.....					2	6	6
51	Wellington and St. Patrick.....					1	1	2
52	Wellington and Centre.....	1						1
53	Wellington and Magdalen.....				1		1	1

SCHEDULE No. 15—Continued.

Nos.	LOCATION. (Distributed through Mountain Park.)	Street watering nozzles	Cast iron foun- tains.	Wood fountains.	Cast iron cattle drink'g iron his	Number of jets.
1	High Level Reservoir .....	.....	1	.....	.....	1
2	Foot of Elevator .....	.....	1	.....	1	1
3	Along side Molson's fence.....	.....	.....	1	.....	1
4	Above Golf Club House.....	.....	.....	1	.....	1
5	About 500 ft. North of Elevator	1	.....	.....	.....	.....
6	Park Road running West side Hall property	1	.....	.....	1	1
7	Park Avenue, opposite St. Jean-Baptiste St	1	.....	.....	.....	.....

Nos.	LOCATION. (Distributed along the Wharves.)	Cast iron foun- tains.	Wood fountains.	Cattle water troughs.	Urinals.	Number of jets.	Street watering nozzle.
1	Wind Mill Point .....	.....	1	1	1	3	.....
2	Allan's Wharf	1	.....	1	1	2	.....
3	Allan's Sheds .....	.....	.....	1	.....	2	.....
4	Custom House (opposite) .....	.....	.....	.....	1	1	.....
5	King's Basin	1	.....	.....	.....	1	.....
6	Dominion line .....	.....	.....	1	1	3	.....
7	Jacques Cartier Square (foot of)	1	.....	.....	.....	1	.....
8	St. Gabriel St. (foot of) .....	.....	.....	.....	.....	.....	1
9	St. Helen's Island Ferry .....	.....	1	.....	.....	1	.....
10	Beaver Line.....	.....	.....	1	1	3	.....
11	Donaldson Line.....	.....	.....	.....	1	1	.....
12	Commissioner East of Barrack Street.....	.....	.....	.....	.....	.....	1
13	Longueuil Ferry.....	.....	.....	.....	1	1	.....
14	Marlboro Street (foot of) .....	.....	.....	.....	1	.....	.....
15	Desery Street (foot of) .....	.....	.....	.....	1	2	.....

ADMINISTRATION.

SCHEDULE No. 16.—Detailed statement of expenditure for the year 1889.

AQUEDUCT.	\$	cts	\$	cts
Repairs to gates, fences and approaches.	187	87		
“ “ bridges and painting.....	422	63		
Cleaning ditches and berm.....	283	27		
Cutting weeds.....	101	20		
Guardian's salary.....	600	00		
Assistant guardian's salary	341	88		
Police service	217	30		
Repairing guardian's house.....	148	16		
Sundries.....	43	06	2345	37

WHEEL HOUSE.

D. Kearney chief engineer.....	1600	00		
Candlish Asst.	700	00		
Vallee “ “	700	00		
C. and A. Lecourt, Oilers.....	880	00		
Repairing machinery.....	105	77		
“ building.....	172	93		
Coal for dwelling.....	235	28		
Grounds round building.	433	31		
Sundries.....	68	10		
Supplies, oils, tallows.....	702	78		
Test pits	76	54	5674	71

ENGINE HOUSE.

Repairs to boilers, steam pipes, for new boilers	429	79		
Repairs to machinery and painting en- gine	621	75		
Repairs to engine and boiler houses....	40	38		
“ “ coal shed and painting	26	10		
Wages	5067	16		
Rent for land	50	00		
Coal for steam.....	7833	68		
S. Veary, engineer.....	1000	00		
Sundries.....	164	11		
Sight feed lubricator	60	00		
Supplies, oil, tallow, &c.....	667	63	15960	60
Carried.....			23980	68

	\$	cts	\$	cts
Brought forward.....			23980	68

TAIL RACE.

Rebuilding wood work of bridge on Lower Lachine Road	1275	21		
Rebuilding fences.....	26	66	1301	87

RESERVOIRS.

Guardian's salary.....	800	00		
McTavish, repairs.....	866	44		
Shovelling snow.....	14	36		
Fuel and light.....	103	39		
Sundries.....	80	74		
High level, repairs	401	06		
" " cleaning	105	23	2371	22

PIPE TRACK.

Repairs to valves.....	42	72		
Staying wall at Atwater Avenue.....	92	12	134	84

HYDRANTS.

Inspecting, wages.....	4833	81		
Repairing, wages and materials.....	2900	74		
Thawing, horses and laborers.....	395	73		
Rent of tap house in St. J.-Bte Ward...	96	00		
New boiler	241	94	8468	22

DISTRIBUTION PIPES.

Repairs to mains services and valves, wages.....	15596	31		
Thawing pipe and carting water.....	324	58		
Inspecting service pipes inside houses..	2808	75		
Dress for 5 inspectors.....	202	00		
Repairs to footpaths and services boxes: wages.....	1108	13		
Materials, iron, castings, lead, tin, &c .	339	06		
" wood, planks, nails, &c.....	400	69		
" bricks, cement, sand, &c.....	40	86		
" rope, drain pipes, &c.....	10	38	20830	76
Carried.....			57087	59

	\$	cts	\$	cts
Brought forward			57087	59

PUBLIC FOUNTAINS.

Repairing, wages.....	918	22		
" materials.....	143	51		
Painting	90	00		
New troughs and drinking fountains....	1225	06	2376	79

WORK SHOP ON LAGAUCHETIÈRE STREET.

Wages, foreman, clerks, turncocks, materials &c	8389	14		
Iron, spikes, nails, tin, lead &c.....	18	89		
Timber, wood, coal oil, &c.....	9	50		
Tools, pails, drinking cups &c.....	37	34		
Rent of foreman's house.....	200	00		
Telephone connections	456	83		
Fuel and light.....	882	46		
Sundries.....	34	58		
Repairing buildings, scales &c	420	01	10448	75

ENGINE HOUSE AT McTAVISH STREET.

One stoker and one ass't engineer	1365	52		
Fuel for engine.....	1008	35		
Oil, tallows, &c.....	109	37		
Repairs to building, new porch.....	276	65		
" " machinery.....	224	77		
Sundry tools.....	31	26		
Sundries	243	89	3259	81

METER DEPARTMENT.

2 meter inspectors.....	1603	50		
Testing, placing and repairing meters..	2369	37		
New meters.....	5755	40	9728	27
Carried.....			82901	21

	\$	cts	\$	cts
Brought forward.....			82901	21

WORK SHOP AT WHEEL HOUSE.

Pipe and machinery dies.....	44	93		
Sundries	1	70	46	63

MISCELLANEOUS.

Contingencies for office, drawing pa- per &c.....	195	14		
Postage stamps, carters, sundries, &c...	416	47		
Horse keep superintendent	600	00		
“ “ foreman.....	400	00		
Damages.....	539	60		
School taxes and assessment outside municipalities.....	776	99	2928	20

STAFF.

Superintendent.....	3000	00		
Ass't Superintendent.....	650	00		
Draughtsman.....	936	00		
Accountant.....	1000	00		
Meter clerk.	800	00		
General “	600	00		
Ass't engineer.....	156	00		
Late superintendent	516	60	7658	60

LOANS.

\$93534 64

PIPE LAYING.

Wages	91941	90		
Tin, lead and zinc.....	6429	21		
Lead pipes.....	7347	21		
Copper, brass works	4875	12		
Timber, cord wood	2419	86		
Bricks, sand, clay.....	2397	27		
Drain pipes.....	361	03		
Special castings.....	26555	27		
Cement	784	74		
Iron steel.....	1553	22		
Tools	1037	74		

Carried..... 145712 57

93534 64

	\$	cts		\$	cts
Brought forward...	145712	57		93534	64
Packing.....	241	28			
Wrought iron pipes.....	527	62			
Cast iron pipes.....	56765	31			
Valve and service stones...	1549	50			
Sundries.....	1134	92			
Rock excavation in St.					
J.-Bte Ward.....	2256	45			
Coke.....	678	30			
Carting pipes.....	2116	57			
Inspecting and testing					
pipes	1060	73			
Duty paid on pipes bought					
in 1888.....	1175	06		213208	31

SPECIALS.

O. Champagne for pro-					
fessional service.....	357	00			
Worthington engine, ba-					
lance	1148	58			
Kearney, (settlement).....	6000	00	19505	58	232713 89
					326248 53

SCHEDULE No. 17.—Inventory of stock on hand, January 1890.

DESCRIPTION.	30"	24"	20"	16"	12"	10"	8"	6"	4"	3"
Cast Iron Pipes (new)	542	327	149	872	881	1718	728	1518	630	.....
Cast Iron Pipes (old) .....	.....	24	9	.....	145	.....	.....	.....	72	.....
Stop-Valves	1	2	.....	2	3	3	7	2	19	18
Slip Sockets	1	13	9	5	22	9	47	11	9	6
Cast Iron Caps .....	.....	.....	.....	4	16	3	5	19	41	2
Cast Iron plugs .....	.....	.....	.....	3	10	14	25	8	40	2
Cast Iron Double Bends .....	.....	.....	.....	.....	.....	4	1	30	2	.....
Cast Iron Elbows .....	.....	.....	.....	.....	3	3	.....	12	25	.....

SIZE.	30x12	30x6	30x4	24x24	24x12	16x12	12x12	12x10	12x6	10x10	10x6
Crosses ..	5	2	2	5	3	1	4	6	13	8	5

SIZE.	10x4	8x8	8x6	8x4	6x6	4x4	4x3
Crosses ...	1	2	16	16	6	4	4

SIZE.	30x12	30x4	24x6	24x4	16x10	12x12	12x10	12x8	12x6	12x4	10x10	10x8	10x6	10x4
Tee's	5	1	4	1	2	6	4	28	28	1	4	6	7	6

SIZE.	8x6	8x4	6x6	6x4	4x4
Tee's	2	1	6	5	4

							TAPERS.									
SIZE.	30x30	30x24	24x24	12x12	12x10	10x10	30x24	24x16	24x6	16x12	12x10	12x8	12x6	10x6	8x6	6x4
Breeches Pipes.	3	1	3	1	2	4	8	1	1	3	3	5	3	5	6	36

Wheel House September 30th 1889.

RESULT OF TEST MADE ON MESSRS KINGMAN & BROWN'S COAL. (INTERNATIONAL).

Engine Started.	Engine stopped.	Time pumping.	Counter at start.	Counter at stop.	Counts made.	Average strokes per minute.	Coal used, in lbs.	No. of lbs. of water raised to Reservoir per lb. of coal.	Total lbs. of water raised to Reservoir in lbs.	Water Meter at start	Water Meter at stop.	Cubic ft. of water evaporated.	Water evaporated per lb. of coal.	Lbs. of residue found.	Percentage of residue.	Coal consumed p. sq. ft. of grate.	bars per hours.	Coal consumed per horse power per hour.	
8.20 a.m.	4.00 p.m.	h. m.	7.40.95	1704.95	7211	5507	47.88	9348	3240	302885	500	16161	17315	1154	717	1264	13.4	18.0	2.9

REMARKS.—All efforts failed in getting an average speed higher than that above stated, for two hours after starting the steam was maintained at and above the required pressure of 110 lbs. after which there was a gradual falling off, the steam falling on several occasions to 90 lbs. This trial clearly demonstrates that, with our present boiler arrangement, it is impracticable to use the above named or kindred coal in our service.

At the end of the trial the grate bars were found completely covered with slag, which bars I have much pleasure in saying came through the trial without being injured, and have further pleasure in stating that if it were possible, under existing conditions, to successfully burn the coal, Mr. Redpath, Ald. Thompson's engineer would accomplish the task.

The whole respectfully submitted.

I remain yours very respectfully,

D. KEARNEY, ENGR P. W.

Wheel House October 29th. 1889.

TEST MADE WITH THE OBJECT OF ASCERTAINING THE ECONOMICAL EFFICIENCY OF THE LEADWATER DEVICE FOR STEAM BOILER FURNACES
AS APPLIED TO THE HEINE BOILER OF THE MONTREAL WATER WORKS.

Engine started.	Engine stop.	Time of pumping.	Counter at start.	Counter at stop.	Counts made.	Average strokes per minute	Coal consumed in lbs.	Lbs. of water raised to reservoir per lb. of coal.	Total water raised to Resv. in lbs.	Water Meter at start	Water Meter at stop.	Cubic ft. of water evaporated.	Water evaporated per lb. of coal.	Lbs. of residue found.	Percentage of residue.	Coal consumed per sq. ft. of grate bars p. h.	Coal consumed per horse power per hour.
7.30 a.m.	5.30 p.m.	h. m. 10.00	90582	99166	8 84	57.23	16100	2932 3272	47212000	42708	44403	1695.0	6.95	1078	6 %	22.0	3.0

340 lbs. more raised to Resv. per lbs. of scotch coal or 10 %

REMARKS.—There was no difficulty in obtaining all the steam required to run the engine full speed. The fires were not cleaned during the run, and the slag was easily removed from the bars at the end of the test. Comparing this ten hours test with a ten hours run with scotch coal on the 1st. of April 1889. I find a difference in favor of scotch coal of 340 lbs. more water raised to the Reservoir per lbs. of coal or 10 %.

By computing the cost of both coals per ton, the commercial advantage can be arrived at, which costs I have not at hand.

The whole respectfully submitted

I remain Yours truly

B. D. McCONNELL, Esq.

D. KEARNEY

Supt. Water Works.

Engr P. W.

Wheel House November 9th. 1889.

TEST MADE WITH SCOTCH STEAM COAL AND LEADBEATER FURNACE.

Engine started.	Engine stopped.	Pumping hrs.	Counter at start.	Counter at stop.	Counts made.	Avg. strokes made per min.	Coal consumed in lbs.	Lbs. of water raised to Rsvr.	Total lbs. of water raised to Reservoir.	Water Meter at start.	Water Meter at stop.	Cubic feet of water evaporated.	Lbs. of residue found.	Percentage of residue.	Coal consumed per sq. ft. of grate bars p. h.	Coal consumed per H. P. p. hr.	Temp. of feed water.	
7.30 a.m.	5.30 p.m.	h. m. 10.00	155,764	163,799	8,635	57.57	17103	2772.547	492,500	55,464	57,072	1,608	6.2	1,434	8.3	23	3.2	187°

Foot pound duty per 100 lbs. of coal 59,424,633.

Wheel House November 13th 1889.

TEST MADE WITH KINGMAN & BROWN INTERNATIONAL COAL AND THE LEADBEATER FURNACE. THE COAL BEING HAND PICKED AND FRESH MINED.

h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
7.30 a.m.	5.30 p.m.	10.00	175,910	184,512	8602	57.34	15760	3062.347	311,000	59,359	61,005	1,646	6.9	1,070	6.7	21.3	3.2	195°

Foot pound duty per 100 lbs of coal 64,242,093.

Wheel House November 19th 1889.

TEST MADE WITH WELSH ANTHECITE COAL AND THE LEADBEATER FURNACE.

h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
7.35 a.m.	5.35 p.m.	10.00	205,822	214,401	8,579	57.19	12,560	3756.747	184,500	65,134	66,760	1,626	8.5	826	4.2	17	2.3	182°

Foot pound duty per 100 lbs. of coal 80,393,107.

9.4 per cent in favor of International Coal over the Scotch Coal.
18.4 " " " " Welsh Anthecite Coal over Internat. Coal.

B. D. McCONNELL Esqr.,

Supl. Water Works.

D. KEARNEY,

Engr. P. W.



ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1890



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Montreal :

EUSÈBE SENEZ

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ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1890



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ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 3rd DECEMBER 1890

Printed by order of the Water Committee



Montreal :

EUSÈBE SENÉCAL & FILS, PRINTERS,

20, ST. VINCENT STREET

1891



ANNUAL REPORT
OF THE
SUPERINTENDENT of the MONTREAL WATER WORKS
FOR THE
YEAR ENDING 31st DECEMBER 1890.

WATER WORKS OFFICE, CITY HALL

Montreal, February 23rd 1891

To the

Mayor, Aldermen and Citizens, of the City of Montreal.

GENTLEMEN,

I have the honor to report on the operations of the Water Department for the year 1890, the general condition of the works and the more important improvements contemplated in the near future. The subject is considered under the following heads, viz : 1st. Aqueduct.—2nd. Low Level Pumping Works.—3rd. Machine Shop and Brass Foundry.—4th. Tail Race.—5th. Pipe Track and Pumping Mains.—6th. Reservoirs.—7th. High Level Service.—8th. Pipe Laying.—9th. Maintenance of Distribution and service Pipes, Hydrants and Fountains.—10th. Consumption of Water.—11th. Meters and House to House Inspection.—12th. Administration.—13th. Quality of Water.—14th. General Remarks.

With an appendix, comprising reports for the year, from the Assistant Superintendent and other officers of the Department and from outside experts, together with tabular statements showing work done and money expended, and giving on various points, information which it is hoped, may be found interesting and useful.

1st. AQUEDUCT.

Two of the farm bridges crossing the aqueduct, viz : at Crawford's and at Stephen's were rebuilt. Penniston's bridge and the crib work abutments of Parker's bridge were repaired. The planking of the bridge of upper regulating gates was renewed. The

culvert under Dumberry's road North of Aqueduct, was repaired.

The bridges along the line of the aqueduct were painted. The fences were repaired where most needing it and a larger amount of ditching than usual, was cleaned. The weeds were cut.

The dwelling at the head of the aqueduct was painted, pretty thoroughly.

Two special constables were employed from early in the summer until the winter, to patrol the aqueduct grounds and prevent any disorderly persons from frequenting them.

Nothing was done to the retaining walls along the banks. They are generally in good condition and even the worst parts will probably take no further harm through the postponement of repairs.

The high spoil banks near the new entrance to the aqueduct and at the junction of the two aqueducts, are diminishing gradually, being slowly washed, on one side, into the aqueduct and on the other, into the back ditches and over the adjacent land.

At the request of the Governors of the Protestant Insane Asylum at Verdun, a pipe was put through the bank of the Aqueduct to supply the Asylum. The work was done by the Department, to be paid for by the Asylum authorities, who are also to supply a meter.

The water power furnished by the aqueduct during the year has been remarkably good, enabling the wheels to pump 3915 million gallons, or a daily average of 10.72 millions gallons, against reservoir pressure. This in spite of frequent interruptions for repairs. The best days pumping done by the wheels in 1890 (and which is also the best days pumping ever done, by water power from this aqueduct) was on April 10th when 14 1/10 million gallons were raised.

For the months of April May and June 1890 the wheels averaged over 13 1/4 million gallons per day.

2nd. LOW LEVEL PUMPING WORKS.

No. 1 wheel and pumps required very little expenditure the past year. This year the large bevel wheel on the countershaft must be recogged.

No. 2, the breast wheel showed such a serious crack in the rim, at the north end, that it was decided to make repairs, which have been done at a cost of about a thousand dollars. The break occurred towards the end of September and three months were occupied in repairs. The job was entrusted to Messrs. J. and R. Wier, machinists of this city, and they did it most satisfactorily. The Chief Engineer at the Pumping Station, reports the wheel good for some years service.

is in good condition. Its pumps, however, as well

V

as those of the breast wheel require frequent packing and very close attention.

No. 4 wheel and pumps worked very well They require very small expenditure for repairs.

The wheel house foundations were in very great danger at one time, water from the settling basin having found its way under the wall of No 1 wheel house. The danger declared itself on 1st July, water entering all the lower portion of the buildings. Repairs were commenced immediately and the earliest opportunity was taken advantage of, to report the state of affairs to the Water Committee. It was not however until the 14th of the month that a quorum could be got together, though meetings were called for the 8th and again for the 10th. On hearing the Superintendent's report, the Committee approved of the steps he had taken and instructed him to proceed with the repairs. The work of stopping the leaks (which was done under the immediate supervision of Mr. Kearney, Chief Engineer, and whose report, to be found in appendix, recounts the whole matter in detail) was necessarily tedious and intermittent, owing to the difficulty of locating the leaks and to the inexpediency of keeping the settling basin empty for more than 36 hours at a time. M. Kearney's persevering and well directed efforts were finally successful, and the leaks were all stopped in about a month, at a cost of some \$3670, which was small, considering the magnitude of the threatened catastrophe thus averted. So far as can be judged the repairs are very thorough, the interior of the lower part of the wheel house being drier now than it has been for many years before.

Some minor repairs to the buildings this year are advisable.

Steam Engine No. 1. Worked well whenever called on, and is now in good condition. The ordinary expenditure for repairs or rather for maintenance, is all that was required last year or likely to be required this year. A second boiler feed pump, as asked for two years ago, would be a desirable addition to this plant.

The steam engine heretofore described as "No 2", which was completed in 1872 at a cost of \$33 650.00 and which pumped during its existence 1315 million gallons, was sold in September last for \$1100.00. The purchaser broke it up into scrap and carted it away. It had not pumped since, 77.

No. 3. Engine has undergone a complete overhauling and repair and is now in good condition.

Both engine houses are in a fair state of preservation.

The Leadbeater furnace and blast was put in the 3rd Heine Boiler, completing the set.

The floors of the boiler house of Nos 2 and 3 batteries were concreted and a very excellent job made of it.

The coal shed and weigh house near it require repairs. Many of the posts of the former, are out of plumb. The walls, too, have

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been shoved by the frost. They show serious cracks. The dwellings will require some small repairs.

The grounds are in fairly good condition.

For details concerning these works see Engineer's report, page 13 of appendix.

The total quantity of water, pumped by water power during the year was 3,914,923,000 gallons, with an expenditure (including heavy repairs to Breast wheel) of \$6 162.23, making \$1.57 $\frac{1}{10}$ per million gallons raised 169 feet or \$0.00 $\frac{3}{10}$ per foot high.

(Note: The expenditure stated above, is that given in schedule No. 16 in appendix, less \$3 663.47 being cost of extraordinary repairs to foundation of Wheel House, which it would seem unfair to charge to cost of pumping. If charged to that it would bring the cost per million gallons raised 1 foot high to \$0.01 $\frac{1}{10}$.)

The total quantity pumped by steam power during the year is 1,340,972,000 gallons, the expenditure for which was \$1 8661.46 equal to \$13.91 $\frac{1}{10}$ per million gallons raised 169 feet or \$0.03 $\frac{1}{10}$ per foot high.

Schedules Nos. 1 and 2, in appendix, give in detail, the performances of the different wheels. Nos. 2 and 3 those of the steam engines, with, in each case, stores consumed, oil, coal, &c., &c. Schedule No. 5 gives a summary of pumping done by each machine, with levels of water in aqueduct.

The following table shows the cost of raising 1 million gallons one foot high, by water power and by steam power, for the last 16 years and the average cost, by each method, for the same period.

YEAR.	BY WATER.	BY STEAM.
1875.....	\$0.0200.....	\$0.119
1876.....	0.0140.....	0.144
1877.....	0.0158.....	0.080
1878.....	0.0106.....	0.170
1879.....	0.0093.....	0.119
1880.....	0.0120.....	0.123
1881.....	0.0136.....	0.121
1882.....	0.0118.....	0.258
1883.....	0.0135.....	0.134
1884.....	0.0124.....	0.211
1885.....	0.0102.....	0.094
1886.....	0.0110.....	0.138
1887.....	0.0092.....	0.117
1888.....	0.0112.....	0.082
1889.....	0.0096.....	0.078
1890.....	0.0093.....	0.082
Average of 16 years.....	0.0121.....	0.129

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3rd. MACHINE SHOP AND BRASS FOUNDRY.

The extension of the shop requires repairs. The roofs of shop and foundry need painting.

Both these places were kept busy during the summer and yet were unable to do all our work. The Water Committee has decided to put another lathe in the shop.

The following is a list of work turned out from the shop.

106	New Hydrants.	
35	do 4" valves.	
51	do 6" "	
45	do 8" "	
27	do 10" "	
49	do 12" "	
2	do 4" valve glands finished.	
11	do 4" " spindles and 2 nuts.	
7	do 6" " "	
394	Service rods.	
2	Hydrant 6" brass bottom plugs 61 lbs.	
2	1" Ground cocks.	
116	$\frac{5}{8}$ " Pneumatic stop valves.	
2974	$\frac{1}{2}$ " " " "	
529	$\frac{1}{2}$ " 2 way branches.	
278	$\frac{1}{2}$ " 3 " "	
197	$\frac{1}{2}$ " 4 " "	
2600	Round ends.	
2600	Square "	} for air tubes.
5400	Pointed "	
5400	Union couplings	
5400	Tube caps	
400	Nipples	
8	1" Pneumatic stop valves.	
56	Watering nozles.	
146	$\frac{1}{2}$ " Nozles.	
2015	$\frac{3}{8}$ " "	
54	1" Nozles.	
45	$\frac{5}{8}$ x $\frac{1}{2}$ " Reducing couplings.	
43	$\frac{1}{2}$ " Steel nozle drills.	
47	$\frac{3}{8}$ " " " "	
1	1" " " drill.	
6	$\frac{7}{8}$ " Studs 4" long 6 $\frac{1}{2}$ lbs. H. L. Eng.	
100	Bolts and nuts.	
52	" " "	
24	2" x 1" Iron bands 199 lbs.	} Bridges, line of Aqueduct
21	$\frac{3}{4}$ " Bolts and nuts.	
8	$\frac{1}{2}$ " " "	
2	Hydrant tumblers and nuts.	

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18	Hydrant brass sockets.	
18	Wrt. Iron keys for No. 2 wheel.	
18	" " gibs " "	
REPAIRS DONE IN MACHINE SHOP.		
1	Ratchet brace.	
7	Air pumps.	
4	Footpath augers.	
18	Hydrants.	
566	Tools for cutting and caulking pipes.	
1288	Pick axes.	
31	Fire irons.	
	Brass Castings delivered from W. W. Foundry for	
	the year.....	17 659 lbs.

4th. TAIL RACE.

The necessary repairs (which were slight) were done to the fences.

A child was drowned in the Tail Race and to facilitate the search for the body, the water was lowered. The body was however found in the river. The lowering of the water revealed the fact that the foundations of the bridge at the Lower Machine Road were considerably undermined. The matter was reported to the Water Committee who ordered repairs to be done and asked Council for an appropriation to cover the cost.

The Superintendent's estimate, made in contemplation of doing the work by ordinary contract, at the most favourable season for such work, viz, the summer, is already far overrun, as became obvious would be the case, so soon as the mode of giving out the work and the season at which it was to be commenced had been decided. When the money was granted the Committee resolved to put the work in the hands of a contractor, he to furnish labour and material and to be paid prices which are to be determined on, after the completion of the work. The matter was the subject of discussion at several meetings of the Committee and the opinion of the City Atty, was asked and obtained as to whether the resolution was binding. The reply being in the affirmative, the Supt. was ordered to instruct the contractor, Mr. E. St. Louis to proceed with the work. A temporary bridge was constructed to accommodate the traffic whilst the permanent one was being demolished and rebuilt. The masonry of both abutments was taken down to about two courses of the bottom, when the water rose and covered the tops of the coffer dams around the foundations. Work had to be suspended, in fact should have been suspended earlier, so as not to leave the banks back of abutments exposed, but the contractor, apparently eager to get on with the work, continued after having been ordered to stop. Besides the temporary bridge and the taking

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down of the masonry, the excavation for a low dam (near the site of the old dam), was made, the object of this dam being to deaden the current at the bridge and so prevent a recurrence of the scour which undermined the bridge foundations. The work was necessarily suspended, until the water lowers. In the meantime the contractor is hauling stone to replace that found defective or broken in taking down the masonry.

5th. PIPE TRACK AND PUMPING MAINS.

The contract for a culvert, under the Grand Trunk Railway near the wheel house, is not yet closed, though the work itself was satisfactorily completed in the fall of 1889. Mr. Nicholson, the contractor, asks to be paid some \$900 extra which, so far, he has not been granted and about \$42.18 of the original contract price, remains in the hands of the Committee.

The 24 inch pumping main laid in Centre street from Atwater avenue to Napoleon Road in 1889, was last year produced to Montmorenci street, and along that street to the Lachine Canal, which was crossed by a double 24 inch main, uniting again in a single 24 inch on the north side of the Canal, and produced to the corner of Guy and William streets. St. James street between McGill and Windsor was also laid with a 24" main in anticipation of permanent paving in 1891 and this year it is proposed to join these two points, viz: St. James street at Windsor and Guy street at William, thus giving a continuous line of 24" pipe from Atwater avenue at Center street to St. Paul street at St. Sulpice, via Centre, Montmorenci, Guy, St. James and St. Sulpice. This line should, with as little delay as possible, be carried eastward, at least as far as Papineau Road on Notre-Dame street, to which point westward from Delorimier avenue, a 24 inch main was laid last year, preparatory to permanent paving of the street by the Road Department this year.

A 20 inch pumping main (being an extension of the 20" from No. 2 Engine, High level Pumping works) was laid in McTavish street, from in front of the reservoir grounds' gate, to Pine avenue and thence westward to Peel street. This main connects at the head of McTavish street, with the 12 inch of Pine avenue running easterly, and at the head of Peel street with the same 12 inch main running westerly and with the 12" pumping main to the High Level Reservoir. All the changes of direction in the pipe, are made by easy sweeps, so as to obstruct the flow as little as possible. The positive advantage from this new main can be seen by reference to schedule No. 7, when the new main came into use which shows a reduction in the pressure on the pumps of from 15 to 20 lbs. per square inch.

The valves and valve chambers on all pumping mains were examined as usual and necessary repairs done.

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The old revetment wall, on the west side of Atwater avenue, between St. Antoine and Dorchester streets, was taken down and rebuilt in a thoroughly substantial manner and with a durable stone. This work exceeded the original estimate very considerably and for good reasons. In the first place, from examining the face of the old wall it appeared that a large part of it was fit to remain. When the adjacent portions were removed, however, it became clear that what looked all right from a front view, was really nearly, or quite as bad, as the rest, so that the whole had to be taken down and rebuilt. Again, just before the work of rebuilding commenced, the Water Committee proposed to grade Atwater avenue and ordered a survey for the purpose. This survey showed that there would be about 4 feet of cutting in front of the new wall, the foundations of which, in consequence, had to be lowered that much, increasing the cost proportionately. Again the nature of the material which the wall sustains, is such that it will not stand at any but a very flat slope which could not be given there, on account of buildings at the back, so that bank and buildings had to be shored up, the former being dealt with by short sections at a time. Altogether, considering the permanent nature of the work done and the difficulties encountered, the City gets good value for the money expended, some \$5 800.00.

6th. RESERVOIRS.

On account of a dead body having been found in the High Level Reservoir, it was cleaned early in the summer. Much inconvenience having arisen from the fact that the tile pipe drain from this reservoir burst every time an attempt was made to use it, the tile pipe was taken up and in its place a cast iron pipe of the same size, 12 inch, was put down. This pipe was taken up from Wellington street, as being unfit for a street main under pressure, but quite good enough as a drain pipe and of course costing the City nothing. It is hoped there will be no difficulty in draining this reservoir in a hurry hereafter, should circumstances call for it. A watchman has been placed at this reservoir to prevent evil disposed persons from polluting in any way the water.

The McTavish street reservoir was emptied and cleaned. It had not been cleaned for many years before and yet the amount of deposit was inconsiderable.

The bottoms of both of these reservoirs, the high and low, have never been graded, they are consequently very difficult and expensive to clean. The cost of grading them, by taking down the high points and filling up the depressions with concrete, finishing with a thin smooth coat, the whole having a fall towards the outlet, would be large, perhaps the interest on the cost would

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equal or exceed the annual cost of cleaning them as they are now, but the time taken to clean the McTavish street one is an important factor in the question. It is not expedient to keep this reservoir empty long and in the present rough condition of the bottom, it would take more men to clean it quickly than can be put into it. If graded as suggested above, it could be washed out every year, in a very short time, with a very few men.

An attempt was made to repair (that is to make water tight) the old portion of the division wall of McTavish Reservoir. Though not completely successful, enough was accomplished to warrant the hope that by continuing the work this year on the same system, the deed may be done. The work was discontinued last fall because the money gave out and besides residents along the upper limits of the low level district, were naturally impatient at the frequent lowering of the water in the reservoir, affecting as it does their supply.

The leaks in the main walls on south side of McTavish reservoir, no longer exist, so far as can be ascertained.

See the report of the Guardian of the Reservoirs, page 20 of appendix, for further information in detail, as to the condition of the property in his charge.

7th. HIGH LEVEL PUMPING STATION.

The buildings are in pretty fair condition with the exception of the coal shed, the roof of which leaks. This and a few other repairs of a minor nature will be attended to this year. An ash-pit was built outside of the boiler house.

Both engines are in good working order. No. 1 did very little work, having pumped only about $1\frac{1}{2}$ million gallons in the year, at certain times when No 2 was under going repairs and when the High Level Reservoir was being cleaned.

No 2 underwent some trifling repairs, the first necessitated by the slipping of the high pressure cylinder jacket, the second from some of the tubes in the surface condenser becoming slightly displaced.

The Water Committee, in the month of October last, entered into contract with Mr. William C. White, boiler maker of this city to furnish a boiler similar in type to, but somewhat larger than, that now in use at these works, for the sum of \$3 950.00. The time of completion was fixed at 15th January 1891 but as some of the steel plates had to be imported, there was a tacit understanding that a reasonable extension of time would be allowed. The work is well advanced and there is a fair prospect of having the boiler in use at an early day.

The consumption of water on the High Level district, increases year by year and out of proportion to the extension of the limits

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of the district. The increase of 1889 over 1888 was 54%, that of 1890 over 1889 is 47%. A remarkable feature in the pumping, is that whereas, it was as stated 47% more than in 1889, the quantity of coal used shows an increase of $67\frac{1}{2}\%$ over that of 1889 and this in spite of the fact given under heading "Pipe Track and Pumping Mains" that in consequence of the laying of a 20 inch pumping main from the engine to Peel street, the pressure on the pumps was reduced to 160 lbs. having, before said main came into use, stood at 115 to 120. The new pumping main was first used in June and a reference to schedule No 7 shows the immediate and marked reduction in the quantity of coal required to raise 1 000 000 gallons viz: the average for the months before June was 4304 lbs. and for those after June 3737 lbs. but even this latter is larger than for 1889, which was 3567 lbs. These figures refer to No 2 Engine (the Gilbert) alone, as the work of No 1, both years, was too insignificant to be included in the comparison. The Leadbeater bars and steam blast came into use in October 1889 and it is noteworthy that the increase in consumption of coal per million gallons pumped, commenced at that same time. This on the face of it, would appear to indicate that the Leadbeater device is to blame. Yet it is perhaps better to reserve judgment until further investigation and trial shall shew more clearly where the difficulty lies. The coal used was partly American and partly Welsh Anthracite, in about the same proportions as in former years.

Schedules 6 and 7 in the appendix show the total number of gallons pumped to have been 185 891 000 with an expenditure (as taken from schedule No 16) of \$5 343.70, equal to \$28.74 $\frac{4}{5}$ per million of gallons pumped or \$0.13 $\frac{1}{2}$ per million raised one foot.

The cost of raising 1 million gallons 1 foot high was:

In 1876.....	\$0.240
" 1877.....	0.253
" 1878.....	0.355
" 1879.....	0.283
" 1880.....	3.274
" 1881.....	0.226
" 1882.....	0.256
" 1883.....	0.286
" 1884.....	0.318
" 1885.....	0.376
" 1886.....	0.250
" 1887.....	0.187
" 1888.....	0.197
" 1889.....	0.121
" 1890.....	0.135
Average of 15 years.....	0.250

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For further details in reference to these works see report (page 20 of appendix) from Mr. Jas. Coleman, Engineer.

8th. PIPE LAYING.

The total length of cast iron pipe laid in the city during the year 1890 is 91199 feet or $17\frac{1}{2}$ miles, the weight of metal being 4500 tons of 2240 lbs. each. The different sizes of pipes laid, their lengths and weights, and the number of valves of different sizes put in are as follows:

	FEET.	TONS.	VALVES
30 inch Pipes	5	1	1
24 " "	9 609	1 201	10
20 " "	5 441	522	3
16 " "	358	25	4
12 " "	40 130	1 846	80
10 " "	8 011	264	36
8 " "	18 157	497	77
6 " "	7 407	136	42
4 " "	2 081	25	62
Total, lineal feet	91199	4 517 tons	315 valves

New hydrants put in, 200.

Service pipes to houses, 2 826.

Allowing for old pipes and valves taken out or abandoned in the ground and for hydrants taken out, the total quantity of main pipe in use in the City to December 31, 1890 is 939 661 feet or 178 miles. Valves to same date 1 790. Hydrants; public 1 352, private 58, all told 1 410. Services to houses 40 403.

Schedule No. 12 in appendix shows the different wards and streets in which pipe laying was done, with the quantities done, for the year 1890.

Schedule No. 13, shows the total lengths of pipe of the different sizes, numbers of valves, hydrants, services etc., actually in use in the different wards of the City, at the end of the year 1890.

Certain portions of the pipe laying presented unforeseen difficulties, notably the 24 inch main of Centre street, where, owing to the fact that the sewer occupies the level properly belonging to the water pipe, the latter had to be put at an excessive depth, to avoid the cross sewers and house drains, so that the pipe cut was, for a considerable distance, subject to inundation from the river through the sewer. Thus the cost was directly augmented in two ways, viz. by increased excavation and by almost daily pumping, besides the fact that after the pipe had been laid and the cut filled, (the work having been done in winter) the flood water found its way along the pipe and caused the cut to sink in many places, so

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that in the Spring, very considerable repairs to the street surface were needed.

There were other parts of the work unusually difficult, but the most serious drawbacks were caused by commencing the summer's work late and without adequate provision of pipes and special castings. This was partly in consequence of the council having deferred voting the money asked until the working season was far advanced, and partly due to contracts unfulfilled; the fact being that the Department worked under heavy disadvantages all through.

A large portion of the pipe laying undertaken was with the view to preparing certain streets to receive permanent paving in 1891. That part of the work was very nearly completed; what remains of it can be done early enough this Spring, not to interfere with the operations of the Road Department.

Some pipe laying in St. Jean Baptiste ward, was also left over. Even had there been time and pipes for it, it could not have been done, because in this ward, the pipes must be laid in the sewer cut, and the sewers have not been built in the streets referred to. Altogether about $6\frac{1}{2}$ miles of the work estimated for has been left over, whilst nearly 3 miles of work unforeseen, but which was peremptorily called for, was done. The pipes for the uncompleted lines are provided and all is prepared for a prompt resumption of the work when the frost leaves the ground.

9th. MAINTENANCE OF DISTRIBUTION PIPES, SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

The report of Mr. Chs. Lagacé, Foreman, together with schedules Nos. 9, 9a and 15 give full details of work under the above heading. Said report and tables may be found in appendix.

The most serious break was on the 24 inch main of Centre street, when a piece about 8' x 1' was blown out of a pipe. This happened about 3 o'clock in the morning of June 12th. The water was shut off in a surprisingly short time considering the locality and the hour, but yet a great number of cellars in the vicinity were flooded and some damage was done to grocery stocks, etc., fortunately buildings were uninjured. The number of main pipes burst in 1890 was 23, no increase over the number of breaks of the year before. The leaks from joints blown out, are much fewer, valves renewed are also fewer. The old 12" main pipe of McCord street (probably the worst water main the City had), has been taken out and a new 12 inch main laid in its place.

A large number of hydrant valves had to be renewed, due in a great measure to injuries from rough usage. It is very difficult to prevent lawless people from making free with these hydrants. Constant watchfulness is necessary. The number of hydrants reported frozen was very large. A fruitful cause of leaks to both service

pipes and mains is the crossing under them of cuts for sewers. In spite of all the care that may be taken to protect the water pipes, the settling of the newly filled earth from under them with the weight of filling above, breaks a great many.

There were 3 new drinking troughs put up, viz, at the corner of Ottawa and Dalhousie streets, St-Catherine street, near Atwater Avenue, and at Papineau Road north of Sherbrooke street. The positions of two others were changed. One additional drinking tap was added. The centre fountain of St. Louis Square Basin was raised and four jets placed near the corners, effecting a marked improvement.

See schedule No. 16 for expenditure under each of the above named heads.

10th. CONSUMPTION OF WATER.

The quantity of water pumped during the year is 5 255 895 000 gallons, or a daily average of 14 399 800 gallons, an increase of over $1\frac{1}{2}$ million on the daily supply for 89, but less than a million increase on that of 88. $74\frac{1}{2}$ per cent of all the water used was pumped by water power, the remaining $25\frac{1}{2}$ % by steam. That is the water power pumping, averaged nearly $10\frac{1}{2}$ million gallons daily and the steam $3\frac{3}{4}$ millions.

Tableau No. 10 shows the average daily consumption for each month and for each year, from 1857 to and including 1890. The yearly variation in consumption, shown by this table, is very irregular and hardly affords a foundation upon which to base a conjecture as to the demand for the next few years, but yet beginning with 1860 and taking by decades, each succeeding one compared with its predecessor shows an increase averaging 67 per c. at which rate, we might look to be using about 23 million gallons daily, at the beginning of the 20th century.— This however may be largely exceeded, it being a generally recognized fact, that the per capita consumption in cities, increases with the population. Montreal however in the last decade, has not conformed to this general rule. the figures being as follows:

YEARS.	* POPULATION.	GALLONS PER DAY.	GALLONS PER CAPITA.
1860	90,000	3,159,000	35
1870	107,000	6,433,000	60
1880	143,000	9,607,000	67
1890	234,000	14,400,000	61

The city works furnish water, by meter, to five outlying municipalities, viz : Cote St. Antoine, St. Louis du Mile End, St. Louis, Cote de la Visitation and Maisonneuve.

The report of the Assistant Superintendent at page 2 of appendix shows to what purposes the water pumped is applied.

* N. B. This includes, population supplied in outside municipalities

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11th. METERS AND HOUSE TO HOUSE INSPECTION.

The number of meters in use at the end of the year was 693. Of these 634 are the property of the city and 59 belong to the persons whose water supply they measure. The total quantity of water supplied by meter is 606.7 million gallons. The expenditure under the head "Meters" was \$10,869 (as may be seen by reference to schedule No. 16). This includes wages, repairs and new meters, but not the salary of the chief Inspector, who has charge of the books and directs the subordinate inspectors of both classes and whose salary is charged under the head "Staff".

The house to house inspection has been continued, the same number of men being employed as in '89, viz : five. The waste detected and stopped has been very considerable. A reference to schedules Nos. 11 and 11A and to the report of the Assistant Superintendent, in appendix, will afford all information, in detail, as to the work done during the year, in the two branches of the water department above named.

12th. ADMINISTRATION.

Schedule No. 16 gives the details of the year's expenditure as well for maintenance as for permanent improvements. The former amounts in total to \$121,186.34, this is paid out of revenue. The latter \$569,327.53 is taken from loans and is principally for pipe laying.

Schedule 18, shows the total cost of each of the different lines of pipe laid, including the hydrants, valves and cross street connections. Schedule No. 19 gives the cost of service pipes to houses.

The following statement showing the average amount of the weekly pay lists for six years back, will convey some idea of the increase of the work of the Department under the above heading.

Average weekly pay list for the years :

1885.....	\$1 099.35
1886.....	1 763.07
1887.....	1 615.52
1888.....	2 214.25
1889.....	2 826.62
1890.....	4 177.72

The number of office employees has also increased somewhat, but not by any means in proportion. One clerk was added in the Superintendent's office and an assistant to the accountant is now required.

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13th. QUALITY OF WATER.

This subject has been freely discussed during the past year

In January your Council passed a resolution calling the attention of the Dominion Government to the pollution of the Ottawa River by sawdust and pointing out the danger to the water supply of Montreal from this cause. The Government in reply caused analyses of samples of the Ottawa water from various points between Ottawa City and Montreal to be made, the results of which were given to the public by a bulletin (No. 15) from the Inland Revenue Department. A reprint of said bulletin will be found at page 35 of appendix.

Your council having also referred the question of the (so called) pollution of the Ottawa River by saw-dust deposits, to the Water Committee, that committee instructed the Superintendent of Water Works to report as to whether the water supply of Montreal is affected by said deposits. But as the Superintendent had not at his disposal, the means of acquiring the necessary data on which to base the desired report, he recommended the Committee to ask your Council for an appropriation to defray the cost of a series of chemical and biological analyses of the City's water to be made monthly, for at least a year. This suggestion was acted on and the Committee even went further, having ordered examinations of samples from the St. Cunegonde and St. Henri supply and from the St. Lawrence at such a distance south from Nun's Island as to ensure getting St. Lawrence water without any admixture of the Ottawa, these with a view of instituting a comparison between them and the City's supply. However it was quite late in the year before the matter was definitely arranged and put into working order. Up to date only two reports have been received, viz, those of Doctor Ruttan and Doctor Johnston, dated respectively 13th and 15th Oct. last. These reports will be found in the appendix. They are printed herewith, more to have them on record in the order of their dates, than with a view to drawing conclusions from them, it being decidedly hazardous to form an opinion as to the quality of a potable water, from the result of a single analysis. With a water such as ours (subject to frequent change of condition) nothing short of a periodic examination, extending over at least twelve months, will enable an expert to pronounce authoritatively on the question.—It may not however be inopportune now, to remind the citizens, that the present source, is the same from which the City has derived its water supply for the past 35 years and that during that time no sickness, epidemic or endemic, has ever been found to have originated from the use of City water, but on the contrary investigation would probably show, that here as in most places, disease flourishes most, in localities where water is used least.

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14th. GENERAL REMARKS.

The Water Committee decided in June last that no distribution main of a smaller size than 8 inches diam. should in future be laid in the City. This resolution, if erroneous at all, certainly errs on the side of safety. Montreal is not the only city that is finding out, perhaps a little late in the day, that the economy in laying small mains, is, to put it mildly, a doubtful one.

The policy which the Water Department has pursued for some years, viz: to perfect, as far as possible the pipe system, as a means of fire protection, is bearing good fruit, as is indicated by the fact, that complaints of scarcity of water at fires, are of the past.

The average pressure also, taken by guage at the different fire stations, and recorded in schedule 14 in appendix, compares favourably with average pressure of former years, showing the pressure generally to be more constant and not so easily affected by intermittent draught.

There will be a good deal of pipe laying to be done this year. The principal item of which is the extension of the 24 inch main already mentioned under heading "Pipe Track and Pumping mains." The rest will be for new streets opening up, or streets about to be permanently paved, in which the existing main is either too small or otherwise not in satisfactory condition to be left for many years. And other streets where from either of the foregoing causes the mains require immediate renewal. Also an endeavour will be made to eliminate many of the dead ends now existing and which require much attention and frequent sludging, to keep the water in them fresh and wholesome.

As stated in an earlier part of this report, the expenditure, both for maintenance and permanent improvements, increases year by year. This is only a natural consequence of the city's growth and, as regards maintenance, may be expected to continue. *Per contra*, the number of service pipes put in annually (about 3000) points, *cæteris paribus*, to a compensating increase of revenue.

A marked feature of the past year, as regards Montreal Water Works affairs, is the agitation for lower water rates, or at all events lower rates for the poorer classes of the community. A special sub committee of the Council has this matter under consideration and may be expected to report at an early day.

I have the honor to be

Gentlemen,

Your obedient servant,

B. D. McCONNELL,

Supt. M. W. W.

APPENDIX

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REPORT of J. O. ALFRED LAFOREST, Assistant-Superintendent of Water Works, on Meters and House-service inspection, for the year 1890.

MONTREAL, 1st March 1891.

B. D. McCONNELL, Esq.,

Supt., M. W. W.

with beg to submit, for your information, the following report upon the Meter and House-service inspection branches of the Department for the year 1890.

METERS.

The number of meters in use, at the end of the year, was 693, being an increase of 23 over 1889. The city owns 634; the other 59 belong to private individuals or companies.

There were 95 new places metered and 60 meters in use were continued.

There were 111 changes of meters made for various reasons, some being out of order and others too small.

The number of meters damaged by frost was 12, one belonging to a private party.

In all these cases the damages were charged to the tenants as there is a by-law holding them responsible for all damages to the instruments on their premises.

The Department purchased during the year 111 new meters. viz:—

64 CROWN:	1	6	inches
	2	4	do
	9	3	do
	2	2	do
	2	1½	do
	12	1	do
	36	0½	do

41 EMPIRE:	2	2	inches
	14	1	do
	25	½	do

6 GEM:	6	3	inches
--------	---	---	--------

Total..... 111

There were also 3 Crown meters purchased by private parties.

1	6	inches
1	4	do
1	1½	do

During the years 1889 and 1890, we destroyed 81 ½ inch and 9 1 inch old Union meters that were completely worn out.

The same meters as before (11) were used this year at the harbour latrines and drinking fountains.

There were also the same 5 meters at the Low Level Pumping works.

The water sold by meter last year and the previous year was as follows:

	1890 Millions of Gallons.	1889 Millions of Gallon .
<i>2669358</i> Railways, including Street Railway	164.73	153.62
Factories and Engines.....	126.80	121.82
Elevators, etc., exclusive of those at Railways and Hotels.....	139.60	115.62
Breweries	30.14	23.10
Hotels	39.23	36.53
Schools, Convents and Colleges	26.76	18.39
Hospitals and Homes.....	9.74	7.89
Church Organs.....	5.14	3.81
Miscellaneous (Photographers, Livery Stables, Skating Rinks, Restaurants, Dyers, etc.).....	30.09	14.45
Outside City limits.....	34.43	20.82
Totals.....	606.66	516.12

Showing an increase of 17 p. c. over 1889.

The following is a list of meters in use from 1876 to 1890.

Years.	Property of W. W. De t.	Property of Private parties.	Total.
1876	279	68	347
1877	294	74	368
1878	239	73	312
1879	227	70	297
1880	236	69	305
1881	266	65	331
1882	307	63	370
1883	380	46	426
1884	421	47	468
1885	467	41	508
1886	508	36	544
1887	542	47	589
1888	562	54	616
1889	610	60	670
1890	634	59	693

There were some meters in use previous to the year 1876, but there was no regular account kept of them.

The schedule No. 11a will give an alphabetical list of the meter tenants, the street, description of establishment, the size, kind and number of the meter, etc.

The schedule No. 11 will also give the number of meters in use and those at the shop, for each year since 1876.

HOUSE SERVICE INSPECTION.

This inspection has been kept up throughout the year by 5 inspectors, the same number as last year.

By the 1st of April 1890, we started a new system of inspection, giving each inspector a book with printed forms.

In this book he has to register the name of the street he is working on, the number of the house inspected, the name of parties occupying the building, the kind of building, the general condition and size of service pipe, the number and sizes of faucets, the number of sinks, water closets, urinals, fountains, hydrants, water engines, etc.

If any leaks found, he has to state in the column of remarks what kind of fixtures were leaking, and number of gallons wasted per

hour by the same. He also verbally notifies the tenant to have it repaired. A few days after, he goes back to the same place to see if it is repaired; if not, the case is brought to the Recorder's Court and the inspector of that district has got to pass all the morning there to wait for his turn, and if several cases occurred in the same morning, we may have all our inspectors there doing nothing.

It is easy to see to what conclusion I want to come.

If we had a good steady man (a good plumber) that could talk and write both French and English, to be outside chief inspector of water, he could take the charge of those prosecutions, do the specials and have a general supervision over the inspectors who, at present, are absolutely left to themselves.

Besides this, the inspectors, instead of taking all saturday to revisit the leaking places and report, would keep steadily on their work and have no reason whatever to be met outside of their districts during the working hours.

The new system adopted last year, although being very efficient, as the following tableau of the quantity of water wasted found by our inspectors will show, would not be complete before we have that chief inspector, whose nomination I hope you will favour.

The result of this inspection with the same number of inspectors as last year (5) was the discovery and stoppage of waste from defective fittings as enumerated below, viz. :

	1889.	Gall. per hour.	1890.	Gall. per hour.
Bib cocks out of repair.	2812 wasting	29666	3763 wasting	42485
Urinal do do	80 do	1346	82 do	1561
Ball do do	1412 do	22492	2006 do	37614
Stop do do	72 do	1405	54 do	817
Closet do do	222 do	4361	191 do	5238
Basin do do	168 do	1820	263 do	3357
Closet valves do	137 do	3426	126 do	2860
Water closet do	68 do	2450	36 do	1143
Pipe burst	907 do	11041	741 do	12966
Other defective fittings	12 do	345	.....	.....
	5890	78352	7262	108041

The increase of 1890 over 1889 is 38 p. c. As the inspectors did not have time to go all over the city during the year, the leaks here enumerated are only a small fraction of what is really wasted.

The following irregularities were also found :

Taps opened to prevent freezing.	38,	wasting	1626	galls	per	hour.
Do flush drains.....	32,	do	1745	do	do	
Using water illegally for building purposes	79					
Using water illegally for Manuf.	20					
Do do do Hand hose	95					
	264	do	3371	do	do	

There were 550 sounds heard on service pipes. In all cases the reports were made to the shop and repaired by the department if the leak was on the street.

Every case of illegal use of water was arrested as soon as discovered.

The number of prosecutions in the Recorder's court was only 58 against 107 last year.

The number of houses inspected was 51,120.

I think the house-service inspection does not receive the consideration that it should, for the good reason that we never tried or rather that we never had any means to find whether it would be advantageous to the department to let the wastes follow their course or have a good battalion of steady men to fight them.

But now that we have all the references we want from the note of last year's inspection which has been done with much care, I will try to prove with figures the saving we are entitled to by making a more minute and more frequent examination of the inside fittings all over the city.

During the last year (1890) our inspection reported 7262 leaks from fittings wasting 108,041 gallons per hour, and 70 cases of negligence on the part of the tenants wasting 3371 galls. per hour doing in all 111,412 galls. per hour.

The average of waste per hour reported was—

$$111,412 \div 300 = 371 \text{ galls.}$$

The daily average of waste is $371 \times 24 = 8904$ galls.

As it took 16 months or 480 days for our present staff of inspectors to go over the city, the waste for the whole year is 1,159,980.-800 galls. The total consumption for 1890 was 5,255,894,761, so that the waste from the inside fittings is 30 % of the whole consumption.

Now we cannot say that if we could stop that waste we would reduce the expenses 30%, because whatever quantity of water we pump, the staff has to be paid all the same, but we could reduce the expenses on oil and on coal.

The following is the cost of the oil and coal used for pumping 1 million gallons of water.

LOW LEVEL STATION:—

Water pumped by water power:

Oil, \$0.10 per million gallons.

Water pumped by steam:

Oil, \$0.25 do do

Coal, 6.40 do do

Total..... \$6.65 do do

HIGH LEVEL STATION:—

Water pumped by steam:

Oil, \$0.77 do do

Coal, 11.33 do do

Total\$12.10 do do

The water furnished by the High Level Service cost much more than that furnished by the Low Level, the water being pumped twice, so that the inspection should be carried out with more care in this district; and another reason is that the pressure being generally much higher there, the inside fittings are more occasioned to leak.

Water delivered by Low Level service (5,255,894,761—185,891,034) = 5,070,003 727. = 96 p. c.

Water delivered by High Level Service.

185,891,034 galls = 4 p. c.

So if we suppose the waste to be in proportion with the quantity of water pumped in the two different services we will have:

Water wasted in:

Low Level service...1,497,581,568 galls.

for the whole year.

High Level service. 62,399,232 do

Total.....1,559,980,800

In using the preceeding figures of the report, we come to the following results :

WATER WASTED, LOW LEVEL :

1,497,581,568 galls. @ \$6.65 per million galls. = \$9958.37

WATER WASTED, HIGH LEVEL :

62,399,232 galls. @ (\$6.65 + \$12.10) \$18.75
per million galls..... = \$1170.00

\$11,128.37

The expenses for the (5) inspectors, during the year,
was \$3,362.75

The quantity of water wasted during the year (1,559,980,800 galls.) exceeds the quantity of water pumped by steam (1,340,972,002 galls.) by 219,008,798 galls.

**COMPARISON OF METER RATES WITH RATES BASED
ON ASSESSED RENTAL.**

	Gallons.
The total quantity of water pumped in 1890, is.....	5,255,894,761
That bringing no direct revenue was:	
Flooding private rinks, etc.....	1,952,480
Fires.....	6,959,852
Watering streets	42,984,000
Public Fountains	35,804,160
Harbour	13,905,704
Steps of Turbines.....	14,604,112
Total.....	<u>116,210,308</u>

Balance producing Revenue..... 5,139,684,453

That charged for at meter rates:

Railways (including Street Railway)...	164,732,127
Factories and Engines	126,803,683
Elevators (exclusive of those at Hotels and Railways	139,606,839
Breweries	30,146,469
Hotels	39,237,198
Schools, Convents and Colleges	26,769,140
Hospitals and Homes	9,741,155
Churches, for Organs	5,142,426
Miscellaneous, Livery Stables, Skating Rinks, Restaurants, Dyers, &c.....	30,092,382
Outside City Limits	34,437,332
Total.....	<u>606,708,751</u>

Gallons.

Balance being that charged for at rates based on
rental and special rates and including waste . 4,532,975,702

The revenue from water in 1890, was:

That from metered water, including rent
of meters, was\$125,523 58

Balance being revenue from rates
based on rental and sundry special
charges\$619,683 65

Total water from which revenue is derived.....5,139,684,453

Revenue from same.....\$745,207 2½

The number of prosecutions for violation of the by-law relating
to the meters was 3.

The monthly inspection and reading of all meters in use, has
been kept up as usual.

Your obedient servant,

J. O. ALFRED LAFOREST,

CIVIL ENGINEER.

Assistant-Superintendent,

M. W. W.

SUMMARY OF STATISTICS

REPORT OF 1890

IN ACCORDANCE WITH THE RECOMMENDATION OF THE NEW
ENGLAND WATER WORKS ASSOCIATION.

MONTREAL WATER WORKS.

Montreal, county of Hochelaga, Province of Quebec, Canada;
supplies also the municipalities of Maisonneuve, Côte St. Antoine,
Côte St. Louis, St. Louis du Mile-End and Côte de la Visitation.

POPULATION.

Montreal, 1890	233,000
Maisonneuve	1,762
Côte St. Antoine.....	2,321
Côte St. Louis	4,000
St. Louis du Mile-End	3,510
Côte de la Visitation.....	869
Total.....	245,462

DATES OF CONSTRUCTION.

LOW LEVEL SERVICE—

Aqueduct.....	}	1856
2 Breast Wheels, with six pumps		
Capacity 4 million gallons per diem.	}	1865
1st 24 inch Rising main		
McTavish Street Reservoir, 15 million gallons.....	}	1865
1 Turbine wheel with two pumps.....		
Capacity 4 million gallons per diem.	}	1867
2nd 24 inch Rising main		
Bartley Steam Engine, 3 million gallons	}	1869
Gilbert do do		
Tail Race lowered	}	1872
Turbine substituted for Breast Wheel		
Worthington Steam Engine, 8 million gallons.....	}	1875
1st 30 inch Rising main		
New Entrance to Aqueduct opened.....		1877

Extension of McTavish Reservoir, bringing its capacity to 35 million gallons	1878
Turbine Wheel 2 pumps, 2½ million gallons	1881
Bartley Engine removed	1885
Worthington Steam Engine, 10 million gallons....	1886
Gilbert Engine removed.....	1890

HIGH LEVEL SERVICE —

Peel Street Reservoir, Capacity 1½ million gallons.	} 1875
Worthington Steam Eng do ½ do per diem.	
1—12 inch Rising main	
Gilbert's Steam Eng., Capacity 3 million per diem.	1889
1—20 inch Rising main.....	1890
Gilbert Engine Removal.....	1890

BY WHOM OWNED.—City of Montreal.

SOURCE OF SUPPLY.—River St. Lawrence.

MODE OF SUPPLY.—Open Aqueduct 5 miles in length.
 74.50 per cent. pumped by water power.
 25.50 do do steam do

PUMPING.**1. Builders of Pumping Machinery—**

Water Wheels.—Wm. Fairbairn & Son, Manchester, England.

John McDougall, Montreal.

W. P. Bartley & Co., do.

R. D. Wood & Co., Philadelphia, Pa.

Steam Engines.—W. P. Bartley & Co, Montreal.

E. E. Gilbert, do

Henry R. Worthington, New York.

DESCRIPTION OF COAL USED.

	Low Level service.	High Level service.
Kind.....	Bituminous	Anthracite.
Size.....	Broken.	Broken and Stove
Brand.....	Scotch and International.	Welsh and American.
Price per gros ton \$4.87....	\$3.65	\$6.00 \$6.45
Per centage of ash.....	5	10
5. Coal consumed for year, lbs. 5,116,430		764,910
6. Total pumped by steam, galls 1,340,972,002		185,891,034
7. Average static head in feet,	169	230
8. do dynamic do	175	251
9. Gallons pumped by lb. of coal	262	243
10. Duty, ft. lbs. per 100 lbs. coal		
(no deductions)	45,875,757	60,998,875
6. Total pumped by water power for year, in gallons ...	3,914,922,759	
7. Average static head, in feet.	189	
8. do dynamic do	175	

COST OF PUMPING FIGURED ON PUMPING STATION EXPENSES.

	Low Level Service.		High
	By Water.	By Steam.	Level Ser. By Sta
Via :	\$6169.23	\$18661.46	\$5343
11. Cost per million gallons raised against dynamic head.....	\$1.57	\$13.92	\$28
12. Cost per million gallons raised 1 foot (dynamic).	\$0.00 $\frac{1}{16}$	\$0.07 $\frac{1}{16}$	\$0.11

CONSUMPTION.

1. Estimated total population at date and outside municipalities furnished.....		2,454
2. Estimated total population supplied.....		3,372
3. Total number of gallons consumed.....gallons		5,255,894.7
4. Passed through meters, domestic	do	449,758.5
5. do manufacturing	do	156,950.1
6. Average daily consumption	do	14,399.7
7. Gallons per day to each inhabitant.....		59
8. do do consumer.....		61

DISTRIBUTION.

1. Kind of pipe used.....	Cast iron.	Wrot. iron & le
2. Sizes do	3" to 30"	2 $\frac{1}{2}$ and unde
3. Extended feet	91451	
4. Discontinued, feet	25045	
5. Total now in use, miles	178	2
6. Hydrants added in 1890	200	
7. do now in use	1356	
8. Stop-tapes added	315	
9. do now in use	1790	
10. Average pressure on mains, day and night at Fire Station No. 9, St. Gabriel Street	69	

SERVICES.

17. Mains	Lead and wrot. iron
18. Extended feet	From 2 $\frac{1}{2}$ " to 1
19. Service taps added (new houses supplied)....	51785
20. Total now in use (houses supplied).....	2826
21. Average length of service pipe	40403
22. do cost of do do	18 ft.
23. Motors added	\$12.25 $\frac{1}{2}$
24. do now in use	35
25. Motors now in use	693
	172

J. O. ALFRED LAFORREST, CIVIL ENGINEER

Assistant-Superintendent, M. W.

LOW LEVEL PUMPING STATION M. W. W.

JANUARY, 21ST, 1891.

R. D. McCONNELL, Esq.,

Superintendent Water Works.

DEAR SIR,

My annual report for the year ending December 31st, 1890 is respectfully presented.

No. 1 WHEEL HOUSE.

All the repairs recommended in my last year's report were carried out, which consisted of some slight patching to the wood work and painting of doors, windows and double windows. A new stairs was placed in position replacing the stone steps removed in consequence of alterations to the delivery mains.

On the 1st. of July a leak sprung through and under the foundation wall which threatened very serious damage to the building, flooding the basement, water main tunnel and pump room to such an extent that they could not be reached. The water was found to be coming from the settling basin, through three separate channels: one from under the Breast-Wheel head race flume, one between the Breast-Wheel flume and the head gates of No. 1 Turbine, and the other under the foundation of No. 1 Turbine head race flume, uniting before reaching the foundation wall of the building and making its way to the North end of the same a distance of about 75 feet tunnelling a passage some 25" x 15 inches and about 18 feet below the surface, then taking a downward course returning through a subterranean passage directly under its upper course some 27 feet from the point of its downward course and 30 feet below the surface making its way under the foundation wall at this point. We found three openings made by the water passing under the wall, one 2' x 5" long, one 7' x 6" long and the other 10' x 9" long all of which openings measured about 10" inches from the bottom of the foundation wall to the hard pan on which the base of the wall was evidently laid as we found no timbers under the wall.

In order to repair these openings we had to excavate 31 feet deep between the settling basin and the foundation wall, a work that required the greatest care, every foot of which had to be stayed in the strongest possible manner, owing to the great pressure of the settling basin on one side of the cut.

So serious was the situation that the Committee resolved while in session to rise and visit the work; which visit filled them with such a sense of alarm that they directed that plans and specifica-

tions be made for the bringing of suction supply pipes to the steam engines from a point a little above the entrance of the Aqueduct into the settling basin, in order that the water could be kept out of the basin for an indefinite period, the City being supplied by steam power while the work of stopping the leak was being proceeded with.

Tenders were called for the necessary pipes, the estimated cost of which, including the work, was \$30,000 but under your able directions in less than forty eight hours after the pipes were advertised for I had the leak effectually and permanently stopped thus saving to the City the amount of \$30,000.

So effectually is the leak stopped that the slight leaks which appeared through the wall in the water main tunnel for many years are no longer present.

The leak coming from under the Breast Wheel flume was mastered by digging 57 feet from the surface and making a double 3 inch sheet piling between the Breast Wheel flume and the South wall of No. 1 Turbine head-race, carrying up a concrete wall between the same, 10" thick. The leak between the Breast Wheel flume and the head gates of No. 1 Turbine was also stopped by means of sheet piling, the piling running from the edge of the settling basin to a buttress of the Breast Wheel flume, entirely trapping the whole space, which was also concreted. There was also sheet piling driven the whole length of the back of No 1. Turbine head race wall between said wall and the foundation of the building, the object of this piling was to enable us to carry up a concrete wall backing the masonry, thus effectually preventing any leakage from coming through the wall it being found in a very leaky condition.

The difficult leak to master was the one coming from under the foundation of No 1 Turbine head race masonry, the wall being very much undermined.

An iron pipe was procured about 6" diam. x 10' long, one end of which was securely fastened into the leak channel and a wall of concrete built around it in order that there would be no escape from the pipe other than into the leak channel and under the foundation so that the space washed out under the wall would be filled up. Cement pans were procured and gangs of men put to work mixing the cement and sand into a thin grout, a constant pour of which was kept up until the pipe was full thus keeping a pressure due to a ten feet head on the solution until the cement set, when the water was let on proving the leak to be a thing of the past.

The washout under the foundation of the building was repaired by thoroughly cleaning out under the wall, finding the hard pan and filling up the space with cement concrete.

All the repairs that at present appear necessary is the painting of the roof and railing of the gallery inside the building.

NOs. 2, 3 AND 4 WHEEL HOUSE

All the repairs to this building called for in my last report were carried out. There is a leak from the Tail Race through the joints of the masonry into the pump room that is more inconvenient than serious, some successful efforts have been made in stopping the heavier portion of these; a portion of the Breast Wheel foundation in the tunnel and the joints of the mason work in the wheel race discharge were pointed. The ice forming here adheres firmly to the cement pointing of the joints pulling the same out when leaving, making it an annual repair.

As the water is making its way through several places in the roof, more than painting may be required when the roof is examined.

THE WORK SHOP.

There is an extension to this building spanning the Waste Weir which shows a very perceptible settling. The extent or nature of the repairs required to remedy this I am unable to state at present, it is so completely covered with snow and ice.

The roof should be painted. The shop is otherwise in fair condition.

THE BRASS FOUNDRY.

This building is in fairly good repair with the exception of the roof which requires painting. The base of the chimney adjacent to the furnace shows signs of working.

THE DWELLINGS.

The repairs recommended to these buildings were not carried out. If it is desirable to keep things up, prevent rot from getting into the wood work, the whole outside wood work should be painted, the roof also. The floor of the kitchen of two of these houses is considerably worn, the occupants request that they be repaired, and that some alterations be made to the partitions.

NO. 1 ENGINE HOUSE.

This building is in good repair with the exception of the roof which should be painted.

There is however the settling of the north east corner of the extension before reported.

THE BOILER HOUSES.

Are all in fairly good order. Cement floors were laid in two of these houses which present a very nice even appearance, the roof requires painting; some other minor repairs to doors and windows may be necessary.

THE COAL SHED.

The building is in very good order. A number of the cast iron upright posts require lifting and resetting, which will be attended to as opportunity will permit. The weigh house attached is in a very dilapidated condition being very much frost heaved.

THE GROUNDS.

The grounds immediately in front of the works being entirely uprooted consequent upon the laying of new mains, were put in their former good condition, there still remains the slope between the Turbine and the Engine House to be put in its former condition, which can only be done after the connection from the 24 " to the 30 " mains are completed. The railing in front of the Wheel House on the Tail Race should be painted.

No. 1 TURBINE WHEEL.

Did good service during the year requiring no repairs worth mentioning. The wooden cogs in the large bevelled wheel on the counter shaft reported as much worn in my last year's report are still intact, it is almost morally certain that they will give out during the present year which will require a stoppage of the wheel for about 18 days while new cogs are being placed in position. Some other minor repairs will likely be necessary.

No. 2 WHEEL.

I predicted in my last year report that heavy repairs might be looked for at any time, which was verified. On the 24th of Sept. a crack made its appearance in the cast iron rim of the north end of wheel. I called your attention to it and stated the nature of the repairs that I thought necessary, in which you concurred. I drew up a specification of the same at your request. The contract was awarded to Messrs J. & R. Wier, engineers and machinists of No. 25 Nazareth Street. The work was commenced on the 27th of October and finished on the 26th of December, which work was performed in a first class and workmanlike manner.

The wheel was not put into service then, there being some repairs necessary to the radial and upright arms, which worked loosely in their sockets, which work is in progress at the time of writing. It is also my intention to have the wheel painted before putting it into service. Of course we have not made a new wheel of it, but it is so much improved that it will be good for some years service. Considerable repairs were done to the pumps and their connections. It is difficult to see what repairs may be necessary to these parts during the year.

No. 3 WHEEL.

The pumps and connections of this wheel were kept in commission by the usual (of late years) frequent packing, many repairs and sharp attention. These pumps and connections like those of No. 2 are in that condition, that it is difficult to see what extent of repairs they may require during the year.

No. 4 WHEEL.

This wheel worked very well requiring no repairs worthy of mention. Present indications are that it will not require much during the year.

No. 1 ENGINE.

This engine is in excellent order although having done a larger amount of work than usual owing to the shortage from the hydraulic machinery due to the leak.

Of course the proper keeping up of an engine of such magnitude and many parts, must always be considerable and incur some expense. We have experienced some difficulty through the giving out of the boiler feed pump. I do earnestly wish you would furnish me with another feed pump as it is anything but profitable or agreeable to be obliged to stop the engine, blow off steam and keep the boiler under banked fires, while repairs are being done to the feed pump.

No. 2 ENGINE OR THE GILBERT ENGINE.

Is a thing of the past it having been removed and broken up for scrap. Its site presents a very inviting appearance for the erection of another engine in its place which in my opinion cannot long be delayed with impunity.

No. 3 ENGINE.

This engine got that thorough overhauling so long desired which was done by our own staff with the assistance of two machinists employed from outside.

The four pistons, high and low pressure, were thoroughly overhauled and put in first class condition. The piston rods were put in the lathe in our own shop and turned. New neck bushes were fitted into the cylinder head stuffing boxes and the glands of the same rebushed. The internal head stuffing boxes between the high and low pressure cylinders were furnished with new spiral springs and six of the piston bolts renewed. The slide valves were refitted also the balance valve pistons. The steam chests and steam chests

covers joints were remade as well as all the steam and exhaust joints, also the throttle valve joints, and the valves refitted.

The reflux valve on the delivery main in the valve pit outside the building was properly adjusted and the stop valve spindle which was found bent and the thread drawn, was put right. Portions of the cylinder drain pipes were renewed, and four new drain cocks connected to the same. The lagging was very much repaired, and one of the bottom stay bolts in the south east pump which was in a leaky condition was put right.

In a word all and everything was overhauled that required overhauling and put in first class order. The engine also got two coats of paint and one coat of varnish.

The engine and all its connections have worked splendidly since they were repaired. The drain pipe in the valve chamber above mentioned is choked, it will require attending to next summer and the chamber should be cleaned out.

No. 1 BATTERY OF BOILERS.

No repairs were done to this battery ; a section of the feed pipe in front of the boilers became leaky, it was removed and several of the main steam pipe joints remade. The boilers fronts and all their connections were painted. They were tested by Mr. E. O. Champagne, City Boiler Inspector on the 11th of September and pronounced all right. The door linings will require to be renewed, and a new set of grate bars may be necessary.

No. 2 BATTERY OF BOILERS.

This battery is in good order also, all the main steam pipe joints and those of the stop valves were renewed. They were also tested by the City Boiler Inspector, on the 11th of September and pronounced all O. K.

No. 3 BATTERY OF BOILERS.

This battery is also in good order, all the main steam pipes and other joints connections were remade and new nipples furnished where the blow off pipe connects with the boiler, which blow off pipe was altered to suit the new cement floor it being graded to carry off the water to the end where the drain is. Some of the brass gauge cocks will require to be renewed, a new set of grate bars will also be necessary. This battery was not tested ; I will call upon the Inspector shortly to do so, they are however in good order.

THE PORTABLE STEAM PUMP AND BOILER.

The apparatus was frequently employed during the year. The boiler shows signs of long service, it being about 20 years old, several of the joints of the shell are leaking, caulking would remedy this, but taking into consideration that the boiler was always too small and the pressure allowed too low for the high lift the pump is frequently required to perform, 20 years practice proving that continuous running with a water lift of 22 feet and 80 lbs of steam is impossible. I believe it would be judicious to have a new boiler of about 25 % more power and carrying a working pressure of 100 lbs of steam. Two lengths of 25 feet each of ejector rubber hose were furnished this pump. This pump and its connections are in good order.

There is at the junction of Atwater Avenue and Centre Street an incandescent light which if removed and replaced by an arc light, it being adjacent to the works would very much assist in lighting the grounds of the same until such time as the Committee in its pleasure may see fit to furnish the works with the light of our times. All the American travellers visiting the works freely express their astonishment at seeing the coal oil lamp brackets in position, thinking such a system of lighting is behind the age.

I would recommend that a Babcock be placed in each of the buildings. One in No. 3 Engine House. One in No. 1 Turbine House. One in the Breast Wheel House and one in the Work Shop; also that a 2½" brass plug cock be attached to each of the stand pipes to which the fire hose are fixed.

In conclusion, I beg to return you my sincere thanks for the kind manner in which you have assisted me in the discharge of my duty.

The whole respectfully submitted,

I have the honor to be, Sir,

Your obedient servant,

D. KEARNEY,

Engineer Low Level Pumping Works.

HIGH LEVEL PUMPING STATION McTAVISH STREET

JANUARY, 1891.

B. D. McCONNELL Esq.,

Supt. Water Works.

SIR,

I respectfully beg to submit my annual report on work done, condition, and requirements of McTavish street Reservoir and pumping station and High Level Reservoir.

THE WORTHINGTON ENGINE.

This engine is in the same condition as last year and requires but a few light repairs: it worked about two weeks last summer during the cleaning out of the High Level Reservoir and whilst making some repairs to the Gilbert Engine. It is ready to work at any moment.

I would recommend this engine to be turned into a condensing engine. It can be done at a small expense by connecting a surface condenser to the suction pipe and get a small donkey or air pump to take away the condensed water, as she makes considerable noise exhausting into the open air.

THE GILBERT ENGINE.

This engine is working every day, has worked well throughout the year, and gave no trouble other than the shifting of the slip-socket in high pressure cylinder; this we set back and so fastened as to give no further trouble; 5 tubes in the condenser also shifted, they were set back and the ends beaded. The friction gear frame got slightly worn and had to be repaired. The 24 brass valves I put in high pressure pump two years ago have worked well and show very little sign of wear.

I renewed 90 rubber valves and 20 springs during the year.

I would recommend the purchase of the big plungers from Messrs Gilbert, as they are fitted to the pumps and we would have no delay in case we wanted to increase the pumping capacity.

The running of the 20 inch main from Engine House to head of Peel street is a decided improvement, it has reduced the pressure on the pumps from 110 to 100 lbs.

Owing to the increased consumption on the High Level Reservoir we will require to increase the annual supply of coal. Welsh coal is most suitable; this coal to be got in large size lumps, none to be received under the size of furnace coal, there is less waste and does best work, and comes cheaper than American coal.

THE BOILER

Worked well during the past year. One joint and a few rivets had to be caulked. The steam superheater gave no trouble at all. The water heater under the boiler gave considerable annoyance by tubes giving out. I had to renew 12 of them. I would recommend a new heater to be made; the tubes to be brass instead of iron, the same bends can be used, this would last much longer and when worn out, the tubes could be sold for old brass, or melted down and used by the department.

The covering on boiler requires some repairing. The steam pipe in Engine room would look better if covered with cotton and painted.

THE DWELLING

Is in good repair; the cornices were painted and a few broken slates renewed the past year. A new set of steam heating pipes is required, the old ones are worn out and leaking. The hot water lead pipe from furnace to bath room will require to be renewed the present one is eaten out by steam and leaky. The outside windows want painting.

THE WORTHINGTON ENGINE ROOM.

The walls of this room require whitewashing, and the wood work to be varnished. The cement water-course around outside of building is broken up with frost and will require to be renewed. I think wood blocks the best. Also to build an arch over the delivery pipe from this building to be about 20 feet long, the present one is falling in, the bricks having crumbled away.

THE GILBERT ENGINE ROOM.

Is in good repair, the cornices were painted. A skylight and a new porch put on which adds much to the comfort of the buildings. All the wood work in this room wants a coat of varnish or linseed oil. I would like a set of cupboards to keep tools in; the floor to be painted and a pair of travelling cranes.

THE BOILER HOUSE.

This house is in good repair, there was a skylight put on the roof and the cornices of the building were painted.

We want two porches for the doors, the walls to be white washed, a new floor to be laid of concrete or flags, and a blow off pipes from boiler to run through the roof.

The new ash pit which was built last summer adds much to the convenience of the place. The chimney is in good order but will require a tapering cap for top to increase draught.

The coal shed is in the same condition as last year, the roof is leaky and will require to be repaired as early in spring as possible. The scale house wants a new floor, the scales to be overhauled and tested.

THE TELEPHONE

has worked rather poorly for the past year, same as year before. Our communications with the wheel-house since the circuit was changed have been anything but satisfactory.

I would recommend a branch of the central telephone to be added here as this is the only station without one, it would give us a double chance to communicate with the City Hall, Wheel-house or Work shop.

HIGH LEVEL RESERVOIR.

This reservoir was cleaned out last summer; there was very little sediment in it, as it was cleaned out the year before. The masonry is in good repair, all joints seem good. It would be recommendable to have the bottom levelled off and concreted as it would save a lot of time when cleaning.

The iron drain pipe laid from Reservoir down to sewer on Peel street is a great improvement over the tile drain.

It would be recommendable to have this Reservoir enlarged as the present capacity is insufficient for the section it has to supply. During the High School fire 28 Nov. 1890, the water lowered a foot per hour, we had to start the Engine and pump three hours extra.

A new door and porch are wanted for the valvehouse.

McTAVISH RESERVOIRS.

These reservoirs were thoroughly swept and washed out last summer, there was a considerable lot of mud or sediment on the bottom. The masonry of the front walls was examined carefully and all soft or bad joints repaired, they are in good order now and show no leakage whatever. There is considerable surface water coming in through back wall to the reservoirs, it will be necessary to dig a trench back of the wall, to concrete and point it in front and rear with cement and puddle back of wall with clay.

The water course around reservoir which is made of cobble stones is in poor condition and should be replaced with one of concrete, to be of any use.

There has been considerable repairing done to the old portion of the centre wall and it requires considerable work done to it yet. There where four coping stones broken out to see how it looked in the middle of the wall, which shows no sign of cement in it, nothing but dry stone and sand. Where those stones were taken out there was a lot of grouting poured in, varying from one half to two barrels cement under each stone. It will be necessary to take up or shift all the coping stones of this old wall to get a chance to pour grouting into it; also to remove stones from sides of wall to get grouting into bottom. There are several small leaks in the new portion of centre wall which will require fixing.

It would be a good idea to empty these reservoirs twice or three times a year. it would change the entire body of water and prevent considerable green scum accumulating.

THE VALVE HOUSE.

The joints in masonry on outside of this building want pointing, the boards over wells to be renewed as they are rotten and not safe to carry any one. We put in four valve rods on drain pipes by which we can work them from valvehouse without going into the well as formerly which necessitated the cutting off of water from the City. Those rods will require to be stayed by iron brackets which will steady and strengthen them. The valvehouse ceiling, doors and windows want painting and the water gauge to be repaired.

THE GROUNDS

The banks, slopes and grounds were kept in good order last summer, the grass regularly cut and weeds cleaned out. The banks were considerably cut up by horses and carts during the cleaning of reservoir, last summer, and it will take about two hundred loads of earth to fix the place up again. The board covering on wall at foot of slopes on Carleton Avenue are decayed want to be renewed and tarred.

The wire fence on bank to be straightened and a wooden fence be put up at north side on Carleton road to protect the place at night and would also prevent people walking on grass slopes. This fence to be same as present one and to be about 260 feet in length.

If we could get an electric light placed in front of valve house it would add much to the comfort of visitors on summer evenings and be of great use to us; it would also light up Carleton road.

The whole respectfully submitted,

I have the honor to be, Sir,

Your humble Servant,

JAMES COLEMAN.

WATER WORKS SHOP, JANUARY, 1891.

B. D. McCONNELL, ESQ.,

Superintendent Water Works.

DEAR SIR,

I respectfully submit the report of the work done under my administration during the year ending 31st December 1890.

REPAIRS, &c.

Schedules Nos. 9-9a show all repairs done to main pipes, hydrants, services, &c.

Improvements to main pipes, hydrants &c., Schedule No. 12 of this appendix, shows the pipes, hydrants, valves, services, &c., laid in the city during the year 1890.

The improvements made on main pipes, have given very good satisfaction; and more improvements should be continued year after year until the City Council, the Fire dept. and the Water Works officials are satisfied that the water pipes in all the Streets of the city are of a sufficient size to maintain the pressure and give abundance of water in case of fires, &c. The importance of these improvements was well shown during the extensive fires that occurred last year. In all cases, no pumps nor steamers were required to extinguish them; for the pressure and abundance of water were all that was required in the localities where large pipes were laid.

Therefore I strongly recommend that larger pipes be laid in all the following Streets.

24" PIPES.

Notre-Dame Street from present end of 24" at Papineau Square to Berri Street.

Berri, from Notre-Dame to Commissioners.

Commissioners from Berri to St. Sulpice.

St. Sulpice, from Commissioners to present end of 24" pipe below St. Paul.

St. James, from present end of 24" at Windsor to Guy.

Guy, from St James to William.

20" PIPES.

Guy, from St. James to Dorchester.

Amherst, from Craig to Notre-Dame.

This would complete the lower level line of rising mains which is of the utmost importance.

16" PIPES.

Amherst, from Sherbrooke to Roy.
 Guy, from Dorchester to St. Catherine.
 Lagauchetière, from Radegonde to Windsor.

12" PIPES.

Dominion, from St. James to St. Antoine.
 Champ de Mars, from Gosford to Lacroix.
 Rousseau from Lacroix to Campeau.
 Common, from below Grey-Nun to Colborne.
 Cathedral, from Osborne to Lagauchetière.
 Ontario, from below St. Germain to East limits.
 St. Lawrence, from St. Catherine to Sherbrooke.
 Papineau Road, from Ontario to Sherbrooke.
 Mignonne, from St. Denis to Harbour.
 St. Catherine, from Harbour to St. Michael Lane.
 Lagauchetière, from St. Radegonde to Papineau Road
 Lafontaine, Fullum to Harbour.
 Notre-Dame, from Mountain to Canning.
 Park Avenue, from Sherbrooke to Pine Avenue.
 Duquette, from Moreau to St. Germain.
 Mignonne, from St. Denis to St. Urbain.
 St. Jean-Baptiste, from Drolet to Berri.
 Bleury, from St. Catherine to Sherbrooke.
 Berthelet, from Bleury to Union Avenue.
 Burnside, from Union Avenue to Stanley
 Guy, from St. Catherine to Sherbrooke.
 Sherbrooke, from St. Denis to Papineau Road.
 Sherbrooke, from McTavish to University.
 Sherbrooke, Guy to Atwater Avenue.
 Atwater Avenue, from Sherbrooke to St. Catherine.
 Roy, below St. Hubert to Mentana.
 Roy, from St. Lawrence to St. Hypolite.
 Rachel, from Cadieux to Berri.
 Mount-Royal Avenue, from St. Lawrence to Cadieux.
 Dorchester, from Fort to Atwater Avenue.
 Congregation, from Wellington to Leber.
 Leber, Sébastopol to Charron.
 Grand Trunk, from Shearer to Napoléon Road.
 Island, from St. Patrick to Grand Trunk,
 Hibernian Road, from Grand-Trunk to Wellington.
 Wellington, from Magdalen to Hibernian Road.
 St. Patrick, from Island to West limits.
 Fullum, from Ontario to near Sherbrooke.
 Shearer, from Center to Grand-Trunk.
 Delisle, from Canning to West limits.

The 12" main in Sherbrooke Street from Bleury to St. Denis, must be completed ; that is, all the cross connections.

University, from Sherbrooke to Dorchester must also be completed.

10" MAINS.

Parthenais, from Mignonne to Amity.

Cherrier, from Amherst 16" main to St. Denis 12" main.

There should be two pipes in that street.

Pine Avenue, from St. Urbain to Amherst ; when it will be opened.

Prince-Arthur, from St. Dominique to Laval Avenue.

Laval Avenue, from Prince Arthur to 10" main at Albina.

Prince-Arthur, from Park Avenue to Durocher.

Durocher, from Sherbrooke to Pine Avenue.

St. Maurice, from McGill to Inspector.

College, from McGill to Chaboillez.

Ottawa, from McCord to near Versailles. Where 10" main goes across the Lachine Canal.

Aqueduct, from St. Antoine to Overdale Avenue.

Argyle Avenue, from Aqueduct to west of Mount St. Mary Av.

Inspector, from St. James to Notre-Dame.

Inspector, from St. Antoine to Lagauchetière ; when opened.

Latour, from St. Radegonde to St. Monique.

Dufresne, from St. Catherine to Nelleda.

St. Etienne, from Mill to Britannia.

Britannia, from St. Etienne to Tail Race, Tail Race side, from Britannia to Conway, or Forfar.

Albert, from Mountain to Chaboillez Square.

Richmond from near Grand-Trunk railway track to intersection of the two 4" pipes south of Richmond Square.

Hutchison Avenue, from Milton to Pine Avenue.

Chaboillez, from College to Notre-Dame, 10" main.

Colborne, from Notre-Dame to Wellington.

St. Urbain, from Mignonne to Pine Avenue

Youville, from McGill to Norman.

Napoléon, from St. Lawrence to Laval Avenue.

Visitation, from Ontario to Mignonne.

Champlain, from below hill to Sherbrooke;

8" MAINS.

St. André, from Dorchester to Ontario.

Davidson, from Notre-Dame to above St. Catherine.

Darling, from St. Catherine to Notre-Dame.

Mignonne, from Desery to near Moreau.

Robillard, from Moreau to Seaver.

Seaver, from Robillard to end of 4" pipe.

Poupart, from Mignonne to Logan.
 Maisonneuve, end of 4" to Sherbrooke.
 Panet " " "
 Beaudry " " "
 St. Pierre Lane " " "
 Montcalm " " "
 St. Christophe " " "
 Longueuil Ferry, from Notre-Dame to C. P. R. tracks.
 Fripbonne, St. Paul to Commissioners.
 Dubord, from St. Denis to Campeau.
 Leroyer, from half way above Claude to Jacques-Cartier Square.
 St. Denis west side, from Ernest to Rachel.
 Sanguinet from Ernest to Pine Avenue.
 Pantaléon from Sherbrooke to Napoléon.
 Pine Avenue, from Mance to Park Avenue.
 Milton, near Park Avenue to Shuter (when opened).
 Clarke, from below St. Jean-Baptiste to Mount Royal Avenue.
 St. Jean-Baptiste, from St. Urbain to Laval Avenue;
 University, from Sherbrooke to Milton.
 St. Catherine, North side, from Fort to Towers.
 Quiblier, from Sussex to near Fort.
 Hunter, from Chatham to Canning.

There are also some main pipes which we proposed to lay last year on many streets which are not mentioned here ; but which should be laid as soon as possible.

All the above named streets should not be permanently paved before all the aforesaid main water pipes are laid in each of them.

The 12" pipe high level line on St. Catherine Street should be connected to the low level line in two places ; say at Atwater Avenue, and at Mountain or Guy Streets.

The main pipes reported defective and too small in my last year's report at page 21 should be attended to.

The pipes with dead ends mentioned in the same report, pages 22, 23, 24, 25, should also be extended as soon as possible.

In all the streets to be widened there will be more or less improvements to do to mains, hydrants and services before said streets are permanently paved.

The 6" pipe on Seigneurs street, below Dorchester, should be lowered as the services on it froze every winter since said street was graded some years ago.

The 24" main in Ontario street will have to be lowered ; if said street is opened with subway, under the Canadian Pacific Railway tracks.

The 10" main on St. Gabriel Street will also have to be lowered to suit new grade. Sludge cocks should also be put on all large pipes to save pumping when emptying them.

12" VALVES REQUIRED.

Corner St. Catherine and Fort Street.
 Corner Ontario and Visitation Street.

10" VALVES REQUIRED.

St. James, corner St. Martin.
 Notre-Dame, corner Colborne or east of Murray.
 Notre Dame, corner St. Vincent.

HYDRANTS IMPROVEMENTS.

Five nozzle hydrants Montreal Water Works Pattern should be put in all the streets, where there is a main pipe large enough to supply them, in place of the old ones ; which are too small and defective and placed as follows :

McGill and Recollet
 Ottawa and Young.
 Notre-Dame and Colborne.
 Dorchester, between St. André and St-Christophe.
 Dorchester and Berri.
 Dorchester and Sanguinet.
 Dorchester and German.
 St. James and Imperial Avenue.
 St. James and Inspector,
 St. James and St. Martin.
 St. James and Chatham.
 St. Patrick and Island.
 University and Pine Avenue.
 St. Lawrence and Guilbault.
 St. Lawrence and Napoleon.
 St. Denis and Roy.

The two steamers for thawing hydrants, &c., want new sleighs, wheels, &c. This should be attended to this year, and the whole should be made ready before the snow is off the ground.

SERVICE REPAIR, &c.

The service boxes on St. Catherine, Mountain, Notre Dame, St-Patrick and in all streets where permanent sidewalks are to be made, will have to be renewed. Those boxes might be made in cast iron $\frac{3}{16}$ of an inch thick with a 3 inch flange at the bottom, a wrought iron rod, and rod holder at about 8" from the top ; which would shut said boxes and prevent any stones or earth filling them up. All new service stop cocks with boxes should be put near the chain stone. It will be advisable to have men to put on service plates, where new wooden sidewalks were made.

FOUNTAINS, &c.

Considerable repairs were done to fountains during the year.

All the fountains and troughs should be painted again early in the spring. I think that one coat of paint will be sufficient.

The trough at the corner of Moreau and Notre-Dame street had to be moved to Notre-Dame street near Ruisseau Migeon.

The position of the trough at Papineau Square had to be changed.

The trough at the corner of Ontario and St. Denis was also changed to about two hundred feet below St. Denis street.

The fountain in St. Louis Square was raised about six feet and four new jets were put in, one in each corner of the large basin.

New troughs, &c, were put on St. Catherine street near Atwater Avenue. On Ottawa, corner Dalhousie. On St. Patrick, near Wellington, where the old one had to be moved on account of new paving and alteration to the street.

A new large basin was made on Papineau Square. Pipes and four jets were put in it.

The Court house square fountain will have to be taken apart to repair one of the pipes broken inside the column.

New drinking troughs and drinking taps might be put in the following places :

Rachel and Frontenac.

St. Denis, corner Roy, opposite the Deaf and Dumb asylum.

Mount Royal Avenue, west of St. Urbain.

Moreau above Logan.

The shops at the corner of Lagauchetière and St. Charles-Borromée street, are now very old and the walls, roof, &c., are not in a very safe condition.

Respectfully submitted,

Your obedient servant,

CHAS. LAGACE,

Foreman.

ROCK GATES, AQUEDUCT, JANUARY 1891.

B. D. McCONNELL, Esq.,

Supt. M. W. W.

DEAR SIR,

I respectfully submit my report on the improvements and repairs done along the line of Aqueduct during the year ending December 1890, which are as follows;

A new bridge at Crawford's and Stephenson's farms. Peniston's bridge was repaired, also the crib work to Parker's bridge. The Regulating gates bridge on Inland cut was planked. The road leading to the new Regulating gates was raised and stoned; the ditch along Parker's and Robert's farms was cleaned. The ditch from culvert on Inland cut, Dunberry's and Frazer's farms to the Lachine Road was cleaned. Ditches and farm culvert, north side from Parker's swamp, were cleaned; also berm ditches on north side of Inland cut. The culvert under Dunberry's road was repaired. Crawford's road was stoned and gravelled. The bridges along the line of Aqueduct were painted. The usual repairs to fences, and approaches to bridges were done, also the usual cutting of weeds.

I remain your obedient servant,

EDWARD SALLY,

Guardian of Aqueduct.

PATHOLOGICAL LABORATORY

MCGILL UNIVERSITY,

Montreal, Oct. 15th 1890.

B. D. McCONNELL Esqr.,

Superintendent City Water Works. Montreal.

SIR,

Following your instructions I have made a biological analysis of samples of water taken from the three sources indicated. The samples were collected on September 22nd at the same time as those taken by Dr. Ruttan. That from the settling basin was re-examined on October 1st.

The number of bacteria present in the different samples was as follows, calculated as per cubic centimetre, or $\frac{1}{16}$ of a cubic inch.

	800 feet south of Nuns Island	Inside Nuns Island.	Settling Basin.	Settling Basin
Date of collection of samples...	Sept. 22	Sept. 22	Sept. 22	Oct. 1
Number of samples examined..	4	4	4	2
Highest number of bacteria in one sample.....	100 per C. C.	62 per C. C.	73 per C. C.	82
Lowest number of bacteria in one sample.....	79 "	48 "	48 "	78
Average of all samples.....	82 "	54 "	57 "	80

These figures show very little difference between the samples, and in the absence of definite information as to the species present in each case I am not inclined to draw conclusions from them, as to the relative purity of these waters.

As far as could be judged from a single examination the bacteria present in the St. Lawrence water appear to be chiefly of the class of harmless, color producing "water" bacteria; while those of the Ottawa waters were chiefly of the class of putrefactive bacteria producing changes in the substance upon which they were grown.

An important fact brought out by the examination is that the minimum number of bacteria present in any one sample was con-

siderably in excess of that which should obtain in a good drinking water, none of the samples therefore are fitted for direct use unless some provision is made for settling or filtration.

The microscopic examination of the sediments in the different samples, did not reveal any positive evidence of contamination, though the Ottawa waters contained traces of vegetable forms (crenothrix) usually found only in stagnant waters. These forms being absent from the St. Lawrence water.

I have the honor to be,

yours respectfully,

WYATT JOHNSON, M. D.

CHEMICAL LABORATORY, MCGILL UNIVERSITY

FACULTY OF MEDICINE

Montreal Oct. 13th 1890.

B. D. McCONNELL Esqr.,

Supt. M. W. W.

DEAR SIR,

In accordance with instructions received from you I collected, on the 22nd of September last samples of water from (1) 800 ft. (about) south of the middle of Nun's Island, (2) about 40 ft. above the pier which marks the point from which the St. Cunegonde water supply is taken, (3) From the settling Basin.

Each sample was taken at a depth of about 2 feet from the surface.

On the 8th of October, in accordance with further instructions, I took samples of water from the Lower Reservoir. These were taken from about the middle of the western half of the reservoir at a depth of about 2 feet.

The tabulated results are given in parts per million and arranged according to the plans adopted by Department of Inland revenue, to facilitate comparison.

In the table the color is not accurately described as no tintometre was available, but the water from the settling basin was of a decidedly deeper brown than either of the other samples of Ottawa water.

Under the head total solids will be seen a column, shewing the proportion of organic and volatile, to the total residue.

This is valuable when samples of water from the same source of supply are to be compared and, in conjunction with the results of the analysis of the organic matter, aids in shewing the relative and absolute value of water.

The results to be found in the accompanying table shew that relatively the waters at the time of analysis should be placed in the following order of purity.

- 1st. Water outside Nun's Island (St. Lawrence).
- 2nd. Water between Nun's Island and St. Cunegonde.
- 3rd. The Lower Reservoir water.
- 4th. The water from the settling Basin.

While none of the samples analyzed are sufficiently bad to be classed as "dangerous" or "impure" yet there can be little doubt that water containing so high a percentage of nitrogenous organic matter as that found in the settling basin must be regarded with suspicion. In the event of an epidemic of any disease communicated by drinking water, no water giving such results could be regarded as perfectly safe.

Since however the Ottawa water is very variable in its composition, especially in its nitrogenous constituents, a few analyses made at irregular periods can give no true conception of its value as a source of supply.

A proper estimate of the true condition of our city water can only be made when the results of a number of systematic analyses extending over a period of at least one year are compared. This is the course adopted by all the large centres of population in Europe and now by many American cities.

I remain sir,

Sincerely yours

R. F. RUTTAN, B A. MD.

Lect. Chem. McGill Univ.

TABULATED RESULTS OF THE ANALYSIS OF FOUR SAMPLES OF WATER TAKEN AS DESCRIBED BELOW.

Reference Nos.	Designation of Samples	Condition of samples when collected.			Total solids (parts per million)				Phenomena on ignition.	Nitrogen (parts per million.)			Chlorine (parts per million.)	Phosphates.	Amount consumed in 15 min.	Amount consumed in 4 hrs.	Oxygen consumed by organic matter at a 80° F. (parts p. mil)
		Temperature	Color.	Turbidity.	Residue after evaporation (ash)	Organic and volatile matter	Proportion of organic & volatile matter to total residue.	As albumenoid ammonia.		As free & saline ammonia.	As nitrates and nitrites.						
205	South of Nun's island (about 800 feet)	17.2° C.	Pale straw nearly colorless.	tinted (mrk'd)	I 131	II 90	III 41	IV 31.29 %	Blackened ...	0.119	0.032	0.186	4.25	heavy traces	0.659	2.601	
206	Between Nun's island and main land.	17.2° C	Light brown	slightly tinted.	112	82	30	26.78 %	Blackened ...	0.156	0.022	0.135	2.55	heavy traces	2.870	4.064	
207	From the settling Basin.	17° C.	brown	slightly tinted.	95	61	34	36.84 %	Blackened with scintillation	0.202	0.024	0.101	3.00	heavy traces	3.451	5.510	
209	From Lower Montreal Reservoir.	not taken	light brown	almost clear opalescent.	77	46	31	40.26 %	Blackened ...	0.168	0.026	0.120	2.50	heavy traces	3.027	4.461	

LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA.

BULLETIN No. 15.

OTTAWA RIVER WATER.

R. MIALl Esq.,

Commissioner of Inland Revenue.

Sir,—In consequence of the passage of a resolution by the City Council of Montreal on the 13th January last, calling the attention of the Government to the pollution of the River Ottawa by sawdust, and pointing out the danger to the water supply of Montreal from this cause, the Minister of Inland Revenue was requested by the Minister of Marine and Fisheries "to allow the Chief Analyst to report on the present and prospective effect on the water supply of Montreal from the escape of sawdust and mill rubbish into the Ottawa River." Since this branch can only deal with the chemical aspect of this matter, it was represented to you that it would be necessary to procure and analyze samples of the Ottawa river water from above and below the Chaudière Falls, and at various points betwixt here and Montreal. Your approval of this course was obtained on the 13th February, but other work prevented the possibility of beginning the collection until the end of March. The results of the investigation, which was carried out by Mr. McGill, Assistant Analyst, were reported to the Department of Marine and Fisheries on the 11th of the present month. These are of sufficient public interest to justify their publication in a bulletin, and they accordingly form the subject of a special report by Mr. McGill, which is attached hereto.

In beginning this investigation it was supposed that the question as to whether the sawdust and lumber refuse which is thrown into the river at Ottawa injuriously affects the quality of its water

lower down could best be answered by ascertaining whether any increase took place in the quantity of the organic matter present in the water in its course towards Montreal. It is well known that the refuse wood and sawdust becomes water-logged and sinks, forming deposits in the river at various points below Ottawa. It there becomes subject to decomposition, and gas is produced, which is sometimes thrown up to the surface of the river in considerable quantity. The nature of the change which goes on is probably analogous to that of the initial stage of the process by which woody fibre is converted into coal. It would not be unreasonable to suspect the formation of peaty matter or humous substances, which might possibly be partially soluble and consequently increase the amount of organic matter in the water. From Mr. McGill's results it would appear that whatever may be the nature of the change going on in the sawdust deposits it is not of such a character as to render their organic matter soluble in water. The water of Deschenes Lake requires fully as much permanganate for the oxidation of its organic matter as does the water below Grenville, that in the Lake of Two Mountains or that supplied to the city of Montreal.

With regard to the Montreal water supply, Mr. McGill's analyses now published show that it is essentially different in character from that of February, 1888. The following analyses, published in Bulletin No. 5, show the quality of the water for that winter:—

Date of Collection	Source.	Nitrogen—Parts per Million.			Chlorine in Chlorides Parts per Million.	Oxygen Consumed by Organic Matter at 8° Fahr.	
		As Albuminoid Ammonia.	As free and Saline Ammonia.	As Nitrates and Nitrites.		15 min.	4 hrs.
1888.							
Feb. 8.....	Wheel-house.....	0·1230	0·0510	Undetermined.	3	0·3 60	0·480
do 11.....	Tap in Fire Station 11.....	0·0658	0·0082	0·1418	3	0·184	0·400
do 11.....	Tap in Fire Station 11.....	0·0526	0·0082	0·0918	3	0·196	0·400
	Average	0·0805	0 0225	0·1168	3	0·247	0·427

The average of analyses Nos. 33-41, in Table II, given in Mr.

McGill's report, show the following figures for the water supplied to Montreal in April, 1890:

	Parts per million.
Nitrogen as albuminoid ammonia.....	0.195
do as free and saline ammonia.....	0.017
do as nitrates and nitrites.....	0.109
Chlorine.....	3.22

Oxygen consumed by organic matter at 80° Fahr.:—

In 15 minutes.	2.688
In 4 hours.....	4.688

The greatest increase is in the amount of organic matter which in the water supply of 1890 was more than ten times the quantity contained in the supply of 1888. The cause of this great difference was explained to me by Mr. Kennedy, Engineer to the Harbour Commissioners, Montreal. It appears that during the winter of 1888 an accumulation of ground ice was formed at the foot of the Cascades rapids, blocking up the channel of the St. Lawrence, damming its water back around the west end of Isle Perrot, and causing it to flow down by St. Anne's. During the same time the water of the Ottawa found its outlet by the "Rivière des Prairies," and Montreal was wholly supplied with water from the St. Lawrence.

I have the honour to be, Sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

LABORATORY OF THE INLAND REVENUE DEPARTMENT.

OTTAWA, 21st June, 1890.

THOS. MACFARLANE, ESQ., F. R. S. C.,

Chief Analyst, Inland Revenue Department.

SIR,—I have the honour to present you, herewith, my report upon the analysis of Ottawa river water, including an examination of the water of some of the more important tributary streams.

The samples were taken at a time when the river was undergoing great changes, due to the spring thaw, which occurred earlier than was expected. In fact I collected the samples from Deschenes Lake, on the 25th March, the ice being perfectly sound, and over two feet thick. Four days later I proceeded to take samples a little below New Edinburgh, and found the ice only 7 or 8 inches thick, and so rotten and honey-combed that it broke with my weight. As a consequence, I found it necessary to delay the collection of samples at certain points until the river should open so as to permit the use of a boat. This accounts for the collection at Canadian Pacific Railway bridge so late as the 8th April, and at Grenville and Carillon so late as the 24th of this month.

As a consequence of these great changes in the character of the river, I have found it a matter of considerable difficulty to interpret some of the results of analysis. It is evident that the addition to it of the accumulated snow of winter must change very greatly the character of any river water for the time being. This change appears, from my work, to lie more particularly in the direction of increase of albuminoid nitrogen. I have not been able to find such full analysis of snow as would enable me to interpret quantitatively my tabulated results in this regard; and I would recommend that, at some future time, work in this direction be undertaken.

I have expressed the colour of the sample, as seen in a column of 24 inches, in terms of the standard glasses adopted by Mr. Lovibond, and furnished with his tintometer. I have found it possible to imitate very closely the colour of most of the samples—in every case after allowing suspended matters to deposit during twenty-four hours, and it is a great advantage to have an exact expression for, and a permanent record of the colour of each sample.

The contradictory results obtained in the case of certain samples emphasize the importance of collection by the analyst himself, wherever this is practicable. A moment's consideration will show that if the quality of an immense body of water in motion—as in the case of the Ottawa and St. Lawrence Rivers—is to be judged by the examination of a gallon of this water, it is of the greatest importance that this sample be absolutely typical of the whole. There are, of course, cases in which it is impossible with certainty to collect a truly average sample of reasonable bulk; but, in most cases, this is possible by carefully considering all the influences due to locality, tributaries, &c., and this can only be done, with perfect satisfaction to the analyst, by himself.

In the column headed "Value" in Table II, I have expressed the total results of analysis in terms of the scale adopted in Bulletin No. 5, page 20. As a ready means of stating, by the use of a single number, the character of a water sample, some such scale as Wigner's is certainly a great convenience. Too much reliance,

however, must not be placed upon any such reading as we have yet been able to give in a single number. Sample 4, for instance, shews better in this regard than sample 3; yet I have no hesitation in placing these samples as regards safety for domestic use in the reverse order. Sample 4 certainly contains less oxidisable vegetable matter, but the nitrogen as ammonia and albuminoid ammonia together with chlorides and phosphates present makes sample 4 much less desirable than sample 3 for food purposes.

As to the fitness of the Ottawa water for domestic uses, I may say that it contains nothing which must of necessity render it unwholesome. At the same time, the presence of so large an amount of organic matter in solution is not only a disagreeable feature, but renders the water capable of sustaining and nourishing, to a much greater degree than most water supplies, those minute organisms, which, while in most cases harmless, are closely related to others known to be specific disease germs. I am of opinion that a water so largely impregnated with organic matter, as is that of the Ottawa River, would become a very efficient *nidus* for the propagation of morbid bacteria, were such organisms once to find entrance to it. At the same time, the purification of the water by household filtration is a very doubtful cure; since the great majority of filters are allowed to remain in use without cleaning, until they do harm rather than good. Filtration, precipitation, or whatever other method of treating a town supply be adopted, should be carried out by the municipality to ensure its efficiency, and certainly the water of the Ottawa River could be improved by proper treatment.

I have the honour to be, Sir,

Your obedient servant,

(Signed), A. MCGILL,

Assistant Analyst.

TABLE I.

CHRONOLOGICAL Tabulation of Samples.

Serial Number.	Collector's Number.	Date.	Place of Collection.	Conditions Obtaining at Time of Collection of Sample.
1	1	1890. Mar. 25...	Des Chênes Lake.....	About 1 mile off Aylmer, in main channel, at depth of about 10-12 feet. The ice was 28 inches thick.
2	2	do 25...	Aylmer Bay.....	From a hole, 100 yards from shore, whence carters draw water for use in the town; water here about 45 feet deep. Ice very dirty.
3	3	do 25...	Des Chênes Lake ...	About $\frac{1}{2}$ mile above rapids, in the main channel of the river. Ice sound, and about 20-24 inches thick.
4	4	do 25...	Britannia Bay.....	From a hole in the ice used by the villagers as a means of access to the water; the hole was covered by boards and the ice clean in the vicinity.
9	5	do 29...	Rideau River.....	From the west channel, at a depth of about 5 feet. The river was not frozen in the immediate neighborhood of the pier.
8	6	do 29...	Ottawa River.....	Above Ernscliffe, <i>i. e.</i> , above sewer mouth, at a depth of 10 feet. Ice about 2 feet thick; sample taken in mid-channel.
10	7	do 29...	do	From hole in ice, about 100 yards above the winter road between Gatineau and Rockliffe; this is below sewer mouths. Ice about 7 inches thick, but very rotten; samples from near mid-river, at depth of 10 feet.
11	8	do 31...	Gatineau River	At Wright's bridge.
6	9	do 31...	Ottawa River.....	Hull water supply. Sample from Aylmer road bridge, about 100 feet above mouth of supply pipe.
12	10	April 2...	do	At L'Ange Gardien, about 200 feet from shore, at depth of 10 feet. Ice quite sound and about 18 inches thick.
13	11	do 2...	Lièvre River.....	At Basin du Lièvre, from pier of road bridge at depth of 3 to 4 feet.
7	12	do 3...	Ottawa River.	At laboratory tap, which was allowed to run at full capacity for two hours before taking sample (aqueduct water).

TABLE I.

CHRONOLOGICAL Tabulation of Samples.—*Continued.*

Serial Number.	Collector's Number.	Date.	Place of Collection.	Conditions Obtaining at Time of Collection of Sample.
		1890.		
33	9,093	April 5...	Montreal.....	From tap in Inland Revenue Office, supplied from lower level reservoir, McTavish St.
35	9,095	do 7...	do	From tap in wheel-house of Montreal water works.
37	9,097	do 7...	do	From upper level reservoir, Montreal water works, Mount Royal Park.
39	9,098	do 7...	do	From the lower level reservoir, McTavish Street.
5	13	do 8...	Ottawa River.....	From floating pier, where new supply is to be taken, at depth of 10 feet; current is very strong here. Pieces of ice floating past, but the main ice is still on the river.
40	4,099	do 8...	Montreal.....	From tap in No. 14 Fire Station, St. Dominique St. Supplied from high level reservoir.
41	9,100	do 8...	do	From tap No. 1 Fire Station, Craig street. Supplied from low level reservoir.
36	9,095	do 11...	do	From tap in wheel-house of Montreal water works.
34	Duplicate. 9,093	do 12...	do	From tap in Inland Revenue Office. Supplied from lower level reservoir, McTavish St.
38	Duplicate. 9,097	do 12...	do	From upper level reservoir, Montreal waterworks, Mount Royal Park.
21	Duplicate. 9,101	do 15...	Ottawa River.....	From river at Sault au Recollet, P. Q., above the rapids. This sample was taken under first span of the C. P. R. bridge, 1 or 2 feet under surface.
22	9,102	do 15...	do	Taken from river at Sault au Recollet, below the second rapids, about 3 miles from where first sample (9.101) was taken, about a mile from Point Viau bridge, from centre of river, 1 or 2 feet under surface.
19	9,103	do 18...	do	Taken from centre of Ottawa River, above head of rapids, at St. Anne's P. Q.
20	9,104	do 18...	do	Taken from centre of Ottawa River, about a mile below rapids, 1 or 2 feet under surface.

TABLE I.

CHRONOLOGICAL Tabulation of Samples.—*Continued.*

Serial Number.	Collector's Number.	Date.	Place of Collection.	Conditions Obtaining at Time of Collection of Sample.
		1890.		
17	9,105	April 18...	Lake Two Mountains.	Taken opposite Forget's Point.
18	9,106	do 18...	Lake Two Mountains.	Samples 9,105-8 where taken from under the ice, about 150 or 200 yards from the shore, a short distance from each other; man would not venture out any further owing to the condition of ice.
14	14 Ottawa.	do 24...	Ottawa River.....	Opposite Calumet in main channel at depth of 10 feet; current very strong; large pieces of detached ice floating down.
15	15	do 24...	do	At Grenville, near entrance to locks and in a strong current at a depth of about 6 to 10 inches.
16	16	do 24...	do	At Carillon, below the locks. Taken from a steam ferry in mid current, at depth of 8 to 10 feet, current very strong.
23	1 Montreal.	May 2...	St. Lawrence River	Sample taken from the head of the Cascade Rapids. Opposite the Cedars Island, the point being the old Government pier situated opposite the farm of one Henry Larne, 3 miles below Cedars Village and 300 feet from the Island, taken at a depth of 10 feet in water 25 feet deep, of a temperature of 42° F. A large amount of rain fell during the previous 36 hours; weather changeable; very high westerly wind.
24	2	do 2...	do	Sample taken from the lake below the Cascade Rapids, the point being a little below the mouth of the Beauharnois Canal—or, rather, opposite to it—at a distance of about one-third of a mile therefrom, taken at a depth of about 10 feet in water 60 feet deep, of a temperature of 42° F. Weather, &c., as described under No. 1.

TABLE I.
CHRONOLOGICAL Tabulation of Samples.—*Continued.*

Serial Number.	Collector's Number.	Date.	Place of Collection.	Conditions Obtaining at Time of Collection of Sample.
25	3	1890. May 3...	Lake St. Louis.....	Sample obtained about midway between Thompson's Point and Lynch Island. Depth of water about 40 feet; temperature, 44° F. Heavy swell, strong S. W. wind, accompanied with rain, in the afternoon. Sample taken at a depth of 10 feet.
26	4	do 7...	do	Obtained from a point about 500 feet south-westerly from the head of Dorval Island, in water about 16 feet deep, of a temperature of 46° F., and at a depth of 8 feet. Weather clear, strong westerly wind; heavy rain during preceding three days.
27	5	do 7...	do	From a point a little east of Lightship No. 2, in water 30 feet deep. Temperature 46° F., and at a depth of 10 feet.
28	6	do 7...	do	From a point about midway between Lightship No. 2 and the easterly end of St. Nicholas Island, in water about 24 feet deep, and of a temperature of 46° F., at a depth of 10 feet.
29	7	do 7...	do	From a point about 200 feet N. E. of St. Nicholas Island, in water 22 feet deep, of a temperature of 46° F., and at a depth of 10 feet.
30	8	do 8...	do	Sample taken outside of enclosing wall of Lachine Canal, about 30 feet therefrom, in water about 16 feet deep, of a temperature of 47° F., and at a depth of 8 feet. Weather clear and calm.
31	9	do 8...	do	Sample taken about midway from pier to Grand Trunk Railway station, at entrance of Lachine Canal, in water about 20 feet deep, and of a temperature of 47° F., and at a depth of 10 feet. Weather clear and calm.
32	10	do 8...	do	Sample taken in inland out near lower Lachine highway bridge, at a depth of 8 feet; water of a temperature of 48° F. Weather clear and calm.

TABLE II.—

Serial Number.	Collector's Designation of Sample.	SOURCE OF SAMPLE.	Date of Collection	COLOR.			
				Yellow (500).	Red (200).	Grey (80).	Green (700).
11	Ottawa..	Deschenes Lake, 1 mile off Aylmer	Mch. 25.	.....	.....	.....	.....
22	do ..	do Aylmer Bay †	do 25.	.....	.....	.....	.....
33	do ..	do head of Deschenes Rapids	do 25.	9.00	1.50	0.75	.....
44	do ..	do Britannia Bay	do 25.	.....	.....	.....	.....
513	do ..	Ottawa River, C.P.R. Bridge, Ottawa	April 8.	9.00	2.25	0.25	.....
69	do ..	do Hull water supply	Mch. 31.	.....	.....	.....	.....
712	do ..	do tap at Laboratory	April 8.	8.00	1.25	0.75	.....
86	do ..	do off Ernscliffe	Mch. 29.	.....	.....	.....	.....
95	do ..	Rideau River, at Cummings' Bridge	do 29.	5.00	0.75	0.25	.....
107	do ..	Ottawa do below New Edinburgh *	do 29.	.....	.....	.....	.....
118	do ..	Gatineau do at Wright's Bridge	do 31.	5.00	1.00	0.25	.....
1210	do ..	Ottawa do L'Ange Gardien	April 2.	6.00	1.00	.....	.....
1311	do ..	Lièvre do at Buckingham	do 2.	4.50	0.50	0.25	.....
1414	do ..	Ottawa do off Calumet	do 24.	7.00	1.50	0.50	.....
1515	do ..	do do at Grenville	do 24.	7.00	1.50	0.75	.....
1616	do ..	do do at Carillon	do 24.	.....	.....	.....	.....
17105	.....	Lake of Two Mountains, off Forget's Point	do 18.	8.00	1.75	1.25	.....
18106	.....	do do do	do 18.	7.50	1.75	0.50	.....
19103	.....	Ottawa River, above St. Ann's Rapid	do 18.	9.00	2.00	2.00	.....
20104	.....	do below do	do 18.	9.00	2.25	2.00	.....
21101	.....	do above Sault au Recollet	do 15.	8.25	2.00	1.75	.....
22102	.....	do below do	do 15.	9.00	2.00	1.00	.....
231	Montreal.	St. Lawrence River, above Beauharnois Rapid	May 2.	1.00	0.50	0.25	0.75
242	do ..	do below do	do 2.	1.00	0.50	.....	1.00
253	do ..	Lake St. Louis, bet. Lynch Island and Thompson's Point †	do 3.	10.00	1.50	2.00	.....
264	do ..	Lake St. Louis, head of Dorval's Island †	do 7.	8.00	1.75	2.00	.....
275	do ..	do lightship bet. Dorval and St. Nicholas Islands §	do 7.	2.00	0.75	0.25	1.00
286	do ..	do between lightship and St. Nicholas Island	do 7.	0.75	0.25	.....	1.00
297	do ..	do N. E. end St. Nicholas Island	do 7.	0.75	0.25	.....	0.75
308	do ..	do outside Lachine Canal	do 8.	10.00	2.00	1.50	.....
319	do ..	do inside do	do 8.	9.50	1.75	2.00	.....
3210	do ..	do inland cut	do 8.	9.00	2.00	1.25	.....
339093	.....	Tap, Inland Revenue Office, Montreal	April 5.	.....	.....	.....	.....
349093	.....	do do do	do 12.	6.50	1.75	1.00	.....
359095	.....	Tap at wheelhouse, Montreal	do 7.	.....	.....	.....	.....
369095	.....	do do	do 11.	10.00	2.00	2.00	.....
379097	.....	Upper level reservoir, do	do 7.	.....	.....	.....	.....
389097	.....	do do	do 12.	5.25	1.25	.....	.....
399098	.....	Lower level reservoir, do	do 7.	5.00	1.00	.....	.....
409099	.....	No. 14 Fire Station, do	do 8.	6.00	0.75	.....	.....
41106	.....	No. 1 do	do 8.	6.00	1.25	0.25	.....

* Does not indicate sewage contamination.

† Previous Sewage contamination = 4800.

‡ " " " = 1000.

¶ " " " = 1500.

§ " " " = 800.

Analytical results.

Dry at 100°	Wt. of Sample	Parts p. M.	PHENOMENA ON IGNITION.	NITROGEN. (Parts per Million)					Oxygen Consumed by Organic Matter at 80° F.		Value	Serial Number
				As Albuminoid Ammonia.	As Free and Saline Ammonia.	As Nitrates and Nitrites.	Chlorine (parts per Million).	Phosphates (parts per Million).	Parts p. Mil.			
									15 m.	4 hrs.		
80.38	44	Blackened	0.138	0.002	0.098	1.50	.....	3.388	6.151	172	1
114.84	53	do with scintillation	0.152	0.026	0.774	4.00	.....	3.815	6.328	179	2
104.56	48	do	0.090	0.006	0.089	1.50	None.	3.472	6.259	172	3	
108.44	44	do with scintillation	0.160	0.070	0.110	3.50	h. t.	2.172	4.294	128	4	
114.84	48	do	0.158	0.008	0.132	1.50	l. t.	3.060	4.886	157	5	
106.56	44	do	0.150	0.026	0.134	1.50	None.	3.248	6.073	170	6	
101.56	42	do	0.160	0.004	0.146	1.50	v. l. t.	3.200	4.051	156	7	
101.56	40	do	0.160	0.011	.....	.....	.....	3.441	5.976	178	8
772.94	76	do	0.350	0.030	0.020	2.00	l. t.	2.956	5.512	178	9	
709.94	44	do	0.160	0.004	0.176	1.50	None.	2.663	5.950	151	10	
84.52	32	do	0.130	0.005	0.135	1.00	None.	2.792	4.510	140	11	
104.52	48	do with scintillation	0.290	0.014	0.096	1.50	h. t.	2.832	5.186	166	12	
92.44	48	do	0.110	0.010	0.130	1.50	None.	2.306	4.144	120	13	
92.44	40	do with scintillation	0.184	0.012	0.148	1.00	l. t.	3.000	5.608	162	14	
89.56	32	do	0.166	0.008	0.054	1.00	l. t.	3.040	5.532	160	15	
116.72	44	do with scintillation	0.106	0.008	0.064	.....	h. t.	3.040	5.566	157	16
112.76	36	do do	0.244	0.026	0.124	1.50	h. t.	2.932	5.512	170	17	
112.76	36	do do	0.214	0.078	0.182	1.50	h. t.	2.948	5.308	166	18	
112.64	48	do do	0.178	0.064	0.056	1.50	h. t.	2.908	5.280	161	19	
116.64	32	do with much scintillation	0.246	0.019	0.104	1.50	h. t.	2.932	5.228	168	20	
104.60	44	do with scintillation	0.216	0.026	0.112	1.50	h. t.	2.828	5.000	159	21	
104.60	44	do do	0.315	0.017	0.123	1.50	v. h. t.	2.788	5.080	169	22	
132.76	56	do do	0.227	0.037	0.073	4.00	h. t.	0.544	1.280	58	23	
132.72	56	do do	0.162	0.017	0.233	3.00	h. t.	0.628	1.392	70	24	
73.40	32	do do	0.238	0.030	0.390	1.00	h. t.	3.128	5.688	176	25	
76.40	36	do do	0.234	0.008	0.462	1.00	h. t.	3.060	5.512	172	26	
120.76	52	do do	0.152	0.012	0.388	3.50	h. t.	0.940	1.868	68	27	
120.80	48	do do	0.130	0.014	0.196	3.50	h. t.	0.628	1.280	61	28	
108.68	60	do	0.102	0.016	0.294	3.50	h. t.	0.612	1.348	58	29	
86.40	28	do	0.174	0.006	0.124	1.00	h. t.	3.212	5.756	172	30	
72.40	32	do	0.140	0.014	0.126	1.00	h. t.	3.184	5.744	167	31	
84.44	40	do	0.154	0.036	0.110	1.00	h. t.	3.172	5.728	165	32	
100.60	40	do	0.154	0.030	0.120	2.00	v. l. t.	2.824	4.864	149	33	
112.64	48	do	0.170	0.000	0.160	2.50	h. t.	2.680	4.816	147	34	
104.56	48	do with scintillation	0.402	0.038	0.082	2.50	h. t.	2.772	4.924	176	35	
114.62	42	do	0.194	0.016	0.074	3.00	l. t.	2.628	4.368	143	36	
92.52	40	do with much scintillation	0.250	0.002	0.000	3.00	tr.	2.744	4.780	155	37	
100.56	44	do with scintillation	0.180	0.008	0.142	3.00	l. t.	2.636	4.600	142	38	
100.60	40	do with much scintillation	0.194	0.010	0.110	3.00	h. t.	2.444	4.264	137	39	
116.64	52	do with little do	0.104	0.018	0.152	6.00	tr.	2.732	4.700	138	40	
108.60	48	do with scintillation	0.114	0.030	0.130	4.00	h. t.	2.720	4.884	144	41	

REPORT ON THE ANALYSIS OF FORTY-ONE SAMPLES OF WATER FROM THE OTTAWA RIVER AND OTHER SOURCES, COLLECTED BETWEEN 25TH MARCH AND 8TH MAY, 1890.

In Table I the samples are arranged in the order of their collection as regards time.

In Table II the samples are arranged in a series, beginning at Lake Deschenes and ending with the Montreal water supply. In the following report the different samples are referred to by the serial numbers assigned to them in Table II.

The following is a synopsis of samples taken from each distinct source of supply :—

	No. of sample.
1. Ottawa River—Deschenes Lake.....	1 and 3.
Aylmer Bay.....	2.
Britannia.....	4.
The River proper.....	5, 6, 8, 10, 12, 14, 15, 16.
2. Lake of Two Mountains.....	17, 18, 19, 20, 21, 22.
3. St. Lawrence River.....	23 and 24.
4. Lake St. Louis.....	25, 26, 27, 28, 29, 30, 31, 32.
5. Montreal water supply.....	33, 34, 35, 36, 37, 38, 39, 40, 41.
6. Rideau River.....	9.
7. Gatineau River.....	11.
8. Lièvre River.....	13.
9. Ottawa City water.....	7.

Of these samples the following are selected to represent the Ottawa water proper in its course from Deschenes Lake to St. Anne's :—

	Sample.	Date of Collection.
(Ottawa water in D. schenes Lake.....	1 and 3	25th March.
do at Hull intake	6	31st do
do at C. P. R. bridge, Ottawa..	5	8th April.
do off Ernscliffe	8	29th March.
do below New Edinburgh.....	10	do
do at L'Ange Gardien	12	2nd April.
do off Calumet	14	24th do
do at Grenville.....	15	24th do
do at Carillon.....	16	24th do
do Lake of Two Mountains.....	17 to 22	15th to 18th April.

Since one object of the present investigation is to determine whether or not the Ottawa water materially changes in character through its course from Deschenes Lake to the Lake of Two Mountains, it will be well to study the results of analysis of the above samples, sixteen in number, apart. The remaining twenty-five

samples illustrate the character of the water supplies of certain localities, the tributaries of the Ottawa, &c., as follows :—

	Sample.	Date of Collection
Deschenes Lake—Aylmer Bay	2	25th March
do Britannia Bay	4	do
Ottawa City supply	7	3rd April.
Rideau River, at Cummings' Bridge.....	9	29th March.
Gatineau River, at Wright's Bridge.....	11	31st do
Lièvre River, at Buckingham	13	2nd April.
St. Lawrence River, at Beauharnois.	23 and 24	2nd May.
Lake St. Louis, at various points	25 to 32	3rd to 8th May.
Montreal water supply	33 to 41	5th to 12th April.

I have already mentioned that the period during which the samples were collected was one of marked and rapid change, for between 25th March and 8th May the ice unexpectedly broke up. The consequent influx of water from melting ice and snow, together with dissolved and suspended matter carried in by tributary streams, greatly affected the character of the river. It is necessary to bear this in mind when instituting comparisons between samples taken at different points along its course. Another important consideration to which I would draw attention is this: In a broad river like the Ottawa there are present, for a certain distance below each point of confluence of a tributary stream, parallel currents which differ more or less from each other as the water of the inflowing tributary differs from that of the main river. Complete intermixture throughout the whole breadth of the river not only does not occur at the point of confluence, but may not occur for miles below it. When covered by ice, and consequently unaffected on its surface by winds, this mingling of the waters is naturally more retarded than in summer when the river is open. In illustration of this I may quote samples 8 and 10, taken by myself on the same day, above and below the sewer mouths at New Edinburgh. The last-mentioned sample shows no change attributable to sewage contamination. The river is here very wide, and the exact location of the main current is unknown to me. The sample was taken as near the middle of the river as convenient, but the result of analysis shows that at this point the stream is not mixed with sewage.

Where samples are taken in open water, it is generally easy to collect in such a way as to make sure that no peculiarly local condition shall cause the sample to vary from the average standard of the main body of water at that point. If the sample be taken close to the shore, a very small rivulet or field drain may affect its quality, although without any important effect upon the main body of water in the river after thorough admixture has taken place. Again, samples taken from a land-locked bay will generally differ greatly

from the average character of the stream. Compare samples 2 and 4, taken in Aylmer and Britannia bays, with samples 1 and 3, which represent the main body of water in Deschenes Lake. Since the ultimate form taken by nitrogenous impurity in water is nitric acid in nitrates, nitrogen in nitrates should be a constantly increasing quantity as oxidation of organic matter proceeds. Exceptions to this increase of nitrogen as nitrates might occur: 1. Through great dilution owing to influx of tributary streams containing comparatively little nitrogen as nitrates; 2. Through the reduction of nitrates where presence of easily oxidisable matter and other conditions favoured such reduction. On the other hand, we should expect nitrogen as albuminoid ammonia to become less in quantity through oxidation as the river proceeds downward. The only samples which can be compared in these respects are given below:—

Number and Place.	Albuminoid Nitrogen.	Nitrogen as Nitrates and Nitrites.
a. { No. 1.—Deschenes Lake.....	0.138	0.098
{ No. 3.—do lower.....	0.090	0.089
(3 miles.)		
	Decrease 0.048	Decrease 0.009
b. { No. 14.—Off Calumet.....	0.184	0.148
{ No. 15.—Off Grenville.....	0.166	0.064
(3 miles.)		
	Decrease 0.018	Decrease 0.094
c. { No. 15.—Off Grenville.....	0.166	0.054
{ No. 16.—Off Carillon.....	0.106	0.064
(12 miles.)		
	Decrease 0.060	Increase 0.010
d. { No. 19.—Above Ste. Anne's.....	0.178	0.056
{ No. 20.—Below do	0.246	0.104
(1 mile.)		
	Increase 0.068	Increase 0.048
e. { No. 21.—Above Sault au Recollect.....	0.216	0.112
{ No. 22.—Below do	0.315	0.123
(3 miles.)		
	Increase 0.099	Increase 0.011
f. { No. 23.—Above Beauharnois.....	0.227	0.073
{ No. 24.—Below do	0.162	0.233
(4 miles.)		
	Decrease 0.065	Increase 0.160

Each pair of samples above was collected on the same day, at points distant by the number of miles stated, and separated by rapid water, a condition favouring oxidation. In the first three

and in the last pairs we find a decrease of albuminoid nitrogen, as was to be expected. In *c* and *f*, where the distance is considerable, and the conditions very favourable to oxidation, we find the decrease very considerable, and attended by an increase in the nitrogen present as nitric acid, although in *c* this increase is not large. On the other hand, we find a marked increase in albuminoid nitrogen in *d* and *e*, a condition of things which cannot be explained, except on the assumption that the samples collected above and below did not represent the average character of the water of the river. This, of course, invalidates, to a certain extent, any conclusions which may be drawn from these samples, and must be carefully borne in mind in using them as illustration of the quality of the water of the lower Ottawa (Lake of Two Mountains). As regards increase of nitrogen in nitrates during downward progress of a stream, this is a matter of less consequence, since not only can we account upon intelligible grounds for a reversal of this order, but in the estimation of nitrogen in nitrates by the zinc-copper couple method we estimate along with it the nitrogen in nitrites, and these are exceedingly unstable compounds, so that their destruction with loss of nitrogen in presence of oxidisable organic matter is not surprising.

In the following table I have arranged those samples which represent the Ottawa river water in its course from Deschenes Lake to Lake of Two Mountains. I have taken the average results of samples 1 and 3, collected on the 25th March, to represent the water of Deschenes Lake, and the average of samples 17 to 22, collected 15th and 18th April, to represent the water of the Lake of Two Mountains. Two elements of uncertainty in regard to conclusions drawn from any comparison of these averages must be kept in mind. First, fully three weeks elapsed between the collections above and below, and these were weeks of rapid change, since during them the main ice on the river broke up, and that on the lakes became very rotten. Second, as pointed out on page 6, samples 19, 20, 21 and 22 show disagreement among themselves, so as to discredit their acceptance as typical of the water supply from which they are taken:—

No.	COLOUR.			SOLIDS.			PHENOMENA ON IGNITION.	NITROGEN.				PHOSPHATES.	OXYGEN CONSUMED.	
	Yellow.	Red.	Grey.	Ignited.	Loss.	As Albuminoid ammonia.		As Free and Saline ammonia.	As Nitrates and Nitrates.	Chlorine.	15 minutes.		4 hours.	
1	.....	.....	.....	80	36	44	Blackened.....	0.138	0.002	0.098	1.5	.....	3.388	6.151
3	9.00	1.50	0.75	104	56	48	do	0.090	0.006	0.089	1.5	None.....	3.472	6.259
Mean.	9.00	1.50	0.75	92	46	46	Blackened.....	0.114	0.004	0.094	1.5	None.....	3.430	6.205
6	.....	.....	.....	100	56	44	Blackened.....	0.150	0.026	0.134	1.5	None.....	3.248	6.072
5	9.00	2.25	0.25	112	64	48	do	0.158	0.008	0.132	1.5	Light traces..	3.060	4.886
8	.....	.....	.....	96	56	40	do	0.160	0.010	.....	.....	do	3.441	5.976
10	.....	.....	.....	100	56	44	do	0.160	0.004	0.176	1.5	None.....	2.663	5.960
12	6.00	1.06	.....	100	52	48	do with scintillation..	0.290	0.014	0.096	1.5	Heavy traces..	2.832	5.186
14	7.00	1.50	0.50	92	52	40	do	0.184	0.012	0.148	1.00	Light traces..	3.000	5.608
16	7.00	1.50	0.75	88	56	32	do	0.166	0.006	0.054	1.00	do	3.040	5.832
16	.....	.....	.....	116	72	44	do with scintillation..	0.106	0.006	0.064	.....	Heavy traces..	3.040	5.566
17	8.00	1.75	1.25	112	76	36	Blackened with scintillation..	0.244	0.026	0.124	1.5	Heavy traces..	2.932	5.512
18	7.50	1.75	0.50	112	76	36	do	0.214	0.078	0.182	1.5	do	2.948	5.308
19	9.00	2.00	2.00	112	64	48	do	0.178	0.064	0.056	1.5	do	2.908	5.280
20	9.00	2.25	2.00	116	84	32	do	0.246	0.016	0.104	1.5	do	2.932	5.228
21	8.25	2.00	1.75	104	60	44	do	0.216	0.029	0.112	1.5	do	2.828	5.000
22	9.00	2.00	1.00	104	60	44	do	0.315	0.017	0.123	1.5	do	2.788	5.080
Mean.	8.46	1.96	1.41	110	70	40	Blackened with scintillation..	0.235	0.038	0.117	1.5	Heavy traces	2.889	5.221
Mean of 17 & 18	7.75	1.75	0.87	112	76	36	Blackened with scintillation..	0.229	0.052	0.153	1.5	Heavy traces..	2.940	5.410
18														

The mean of 17 and 18 does not, however, differ greatly from the mean of 17-22, except in the nitrogen as nitrates and nitrites. If we compare these means with those representing the water of Deschenes Lake, we find slightly less yellow and more red and grey in the colour. The total solids have increased, especially in the mineral component, the organic solids being less in quantity, an indication which is corroborated by the less amount of oxygen absorbed from permanganic acid. The chlorine remains unchanged, while the nitrogen as nitrates has increased considerably. Thus far the changes are altogether what might have been looked for. The increase of inorganic nitrogen is natural consequence of the oxidation of nitrogenous matter of less stable character. The scintillation observed on igniting the residual solids is probably caused by the presence of these nitrates. The decrease of oxidisable organic matter is a natural consequence of the oxidation which has been effected during the course of the river. The increased solids are probably due to the material carried into the river by tributary streams as these are swollen by melted snow and ice, as well as to the debris which has accumulated on the ice during winter now finding its way into the water. The only items which call for remark are the great increase of albuminoid nitrogen, the still greater increase of nitrogen in ammonia (an amount which is yet greater if we consider only samples 17 and 18), and the increase of phosphates. The presence of these last can scarcely otherwise be accounted for than as indicating animal excreta. Since they are present in traces only, and do not indicate the presence of sewage in other than a fully oxidized and therefore harmless condition, we may omit further consideration of them, since the drainage of Ottawa city, with that of towns and villages along the banks of the river, sufficiently accounts for their existence.

It is different, however, with the nitrogen as ammonia and albuminoid ammonia. That this, instead of decreasing, should have doubled in amount, and in the case of ammoniacal nitrogen have increased ten-fold, requires some explanation. These estimations were all made in duplicate, and closely agreeing results obtained. I conceive that the true explanation of this great increase of ammoniacal nitrogen is to be sought in the melting of the snow and ice on the river. Snow carries down with it ammonia from the air; this accumulates with the accumulation of the snow during the winter, and when spring opens is introduced at once into the water of the river, along with all the organic debris, microscopic organisms, &c., which are known to exist in snow and ice.

So far, then, as a comparison of the waters of Deschenes Lake with that of Lake of Two Mountains is possible from the result of this enquiry, I am not justified in saying that any deterioration has taken place. On the contrary, in spite of addition of organic debris from the breaking up of the ice, the water of the river has improved

as far as reduction of organic matter is concerned, the improvement being undoubtedly due to the aeration effected by rapids and cataracts on its course.

Aylmer Bay (Sample 2.)—The analysis shows slightly increased total solids; a very marked increase in nitrogen as ammonia, as albuminoid ammonia and as nitrates; chlorine in chlorides more than doubled, as compared with the average water of Deschenes Lake. It is the only sample, collected before the breaking up of the ice, which shows a sufficiently large amount of inorganic nitrogen to indicate previous sewage pollution when calculated upon Frankland's formula. These results are not surprising, when it is remembered that the water was taken from a hole in the ice used by carters who draw water for the town. The water was only about 4 feet deep, and the surface of the ice in the vicinity was thickly covered with straw and manure, the soluble portions of which must with every shower of rain, every thaw, and by the water spilled in filling the barrels, be washed into the bay, which at this point (only one hundred yards or so from shore) is almost land-locked. The use of such water for domestic purposes is certainly attended with great danger to health. It would appear to be an easy matter to enact police regulations which should compel the water-carriers to take water from a point much farther out from shore where the current would effect a constant change in the water; and also to insist upon the frequent change of place, that the droppings from the horses might not accumulate, to create a nuisance in the neighbourhood of the source of supply.

Britannia Bay (Sample 4.)—This, like the preceding sample, shows the influence of local causes in changing the character of a natural water supply. The solids, the nitrogen and the chlorine are all increased; heavy traces of phosphates appear, though none are found in the main body of lake water. The oxygen absorption is greatly decreased, owing, no doubt, to the undisturbed character of the water in the bay giving the suspended organic matters an opportunity to subside; possibly in part to their oxidation at the expense of nitrates, which are here very low as compared with the albuminoid and ammoniacal nitrogen. The ice was quite clean on the surface at this place, and the hole was protected by a wooden lid. Still the analysis shows that it would be better to go farther out into the lake. The water below the ice was little more than a foot in depth here.

Ottawa City Supply (Sample 7.)—This was taken from a tap at the laboratory of the Inland Revenue Department, the water having run freely for some hours before collecting the sample. Except in the matter of albuminoid nitrogen it shows no important variation from Deschenes Lake water collected some eight days earlier. In explanation of the increase of albuminoid nitrogen, we have the facts that the water came through the old wooden pipe in

the aqueduct, and doubtless received additions by leakage; and that though no extensive break up of ice had yet occurred, certain amount of thaw was in progress. The matter oxidisable by permanganate is very much less than that found in the lake water, showing that oxidation had taken place to some extent in the course of the passage down the Deschenes rapids, and probably also in the system of pipes leading from the pumping station to the city.

Tributaries of the Ottawa.—Rideau River (Sample 9); Gatineau River (Sample 11); and Lièvre River (Sample 13). All of these show a much lighter colour than the water of the main river. The total solid matter is much higher in the Rideau, while in the Gatineau and Lièvre it is slightly lower than in the Ottawa. Again, while the Gatineau and Lièvre rivers show much the same results in nitrogen as the Ottawa, the Rideau gives very high albuminoid nitrogen, about three times as much as the Ottawa, the free ammonia also being high. In chlorine the Gatineau gives a lower and the Rideau a higher number than the Ottawa. The Rideau is the only one of the three which show traces of phosphates. In oxidisable organic matter the Rideau gives the highest amount, this being somewhat less than is found in the Ottawa itself; the Gatineau and Lièvre gives considerably less than the Ottawa.

On the whole, then, the Gatineau and Lièvre rivers are of a character to improve the main stream which receives them. The Rideau River, on the other hand, is a source of pollution to the Ottawa, and should certainly not be used for domestic purposes by people living near Cumming's Bridge where the sample analyzed was taken.

Samples 23 and 24 are taken from the St. Lawrence River opposite Beauharnois. The water of this river is entirely different from that of the Ottawa. The colour contains but little yellow and red, and a decided green component. The solids, especially the inorganic solids, are decidedly higher than in the Ottawa. The nitrogen is higher in the samples collected, but it is to be borne in mind that these were taken when the river contained the ice and snow contributed by the spring thaw. It should be compared, therefore, with samples 14 to 22, when it will be found not inferior to Ottawa water at nearly the same date. The past-sewage contamination is higher (as might be expected), as seen not only in the high nitrogen in nitrates, but in the chlorides and phosphates. The organic matter oxidisable by permanganate is, on the contrary, very much less than that in the Ottawa, being, in fact, only about one-fifth to one-fourth of the amount. The character of the St. Lawrence and Ottawa waters are so distinct that it will be easy to identify each in the water of Lake St. Louis which receives both rivers.

Lake St. Louis.—An examination of the results of analysis of

samples 25 to 32 shows that of these 25, 26, 30 31 and 32 are practically Ottawa river water, while 28 and 29 are St. Lawrence river water, and 27 is a mixture of the two in which St. Lawrence water greatly predominates. Since the matter oxidisable by permanganate is one of the most sharply defined characters by which these rivers may be distinguished, it is in the columns containing the results of this estimation that the distinction is most clearly seen; still the colour, the total solids and the chlorine determinations emphasize the indication of the oxygen absorption.

Montreal Water Supply.—Samples 33 to 41 represent Montreal City water, as collected at the points named from the 5th to the 12th of April. It is evident that this supply is taken essentially from the Ottawa river. This appears from the colour, the total solids and the large oxygen absorption. An important variation as compared with the river water proper, occurs in the chlorine content. This change is probably due to the reservoir system; at least no other explanation suggests itself to me. In samples 37 to 39, taken directly from the reservoirs, the chlorine in chlorides is three times as high as that found in the Ottawa water of Lake St. Louis. And if it be said that this was collected about a month later, when the volume of water had greatly increased, then a comparison with samples 5, 7 and 17 to 22 will show that at about the same date the Montreal reservoirs contained double the chlorides found in the Ottawa river. The exceptionally high chlorine of samples 40 and 41 may possibly be of purely local origin.

No. 1.—SCHEDULE SHOWING THE WORK OF TURBINE No. 1.

MONTHS 1890.	Time of pumping.	Revolu- tions.	Gallons pumped.	Pressure in air vessel.	IN POUNDS.				
	Hrs. M.				Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.	Coal for heating.
January.....	740.30	571,556	133,172,548	75.00	139.50	.....	195.00	26.50	106,480
February.....	672.00	499,847	116,464,351	76.00	126.00	.....	154.00	25.25	75,820
March.....	744.00	601,139	140,065,387	78.00	139.50	40.00	163.00	25.25	74,280
April.....	720.00	617,874	141,964,642	77.00	135.00	25.00	139.00	26.50	74,320
May.....	740.20	635,813	148,144,429	76.00	139.50	40.00	124.00	25.62	35,390
June.....	706.25	620,112	144,486,096	76.00	135.00	45.00	120.00	25.50	.....
July.....	572.50	389,567	90,769,111	78.00	105.75	.....	132.00	23.00	.....
August.....	697.20	501,167	116,771,911	75.00	130.50	.....	147.00	28.87	.....
September.....	710.00	615,359	143,378,947	74.00	135.00	40.00	153.00	23.38	.....
October.....	684.00	511,388	119,153,404	77.00	128.12	35.00	176.00	26.00	72,920
November.....	586.00	516,720	120,395,760	75.00	112.50	.....	145.00	22.00	76,180
December.....	720.00	577,265	134,502,745	77.00	139.50	.....	184.00	27.81	87,290
Total.....	8293.25	6,657,807	1,551,269,031	.....	1,565.87	225.00	1,832.00	305.68	602,680
Average.....	.....	.....	.....	76.00	1,539.00	256.00	1,803.00	323.43	.....
Last year (1889).....	8293.35	5,936,531	1,383,211,723	84.00	.....	.....	.....	.....	547,130
Average ".....	.....	.....	.....	.....	.....	.....	.....	.....	.....

No. 2.—SCHEDULE SHOWING THE WORK OF THE BREAST WHEEL No. 2 AND TURBINES Nos. 3 AND 4.

Months, 1890.	Time of pumping.			Revolutions.			Gallons pumped.	Pressure in air vessel.	In pounds.				
	Breast wheel.	Turbine.		Breast wheel.	Turbine.				Castor Oil.	Coal Oil.	Cotton waste.		
		No. 2.	No. 3.		Hrs. M.	Hrs. M.							
												No. 2.	No. 3.
January.....	742.00	585.50	689.05	572.382	381,237	879,667	216,787,834	76.00	228.00	193.00	32.75		
February.....	672.00	65.00	424.15	513.041	31,341	455,899	119,775,850	76.00	112.50	154.00	29.25		
March.....	730.00	391.00	702.40	567.632	296,196	954,585	209,940,854	77.00	211.50	163.00	29.75		
April.....	720.00	720.00	726.00	580.260	559,165	1,029,617	257,181,962	75.00	270.00	139.00	30.75		
May.....	732.45	736.50	744.00	576.471	574,530	1,082,960	263,482,708	75.00	279.00	124.00	31.75		
June.....	658.20	688.15	710.50	527.547	554,639	1,058,230	251,171,308	75.00	270.00	120.00	29.75		
July.....	403.10	506.50	590.35	302,343	335,854	707,322	155,282,844	77.00	184.50	132.00	25.78		
August.....	571.25	458.25	701.10	386,621	307,801	862,664	176,963,560	76.00	227.50	147.00	30.00		
September.....	616.10	709.00	710.00	463,161	566,184	978,410	236,486,320	74.00	254.25	153.00	31.00		
October.....	351.00	684.00	684.00	560,605	487,155	821,568	181,323,322	75.00	202.50	176.00	26.00		
November.....	.....	585.40	585.40	.....	500,289	829,360	145,367,732	75.00	144.00	145.00	27.00
December.....	.....	702.00	720.00	.....	501,991	873,846	149,889,424	76.00	162.00	184.00	26.18
Total.....	6,198.50	6,832.50	7,982.15	4,750,063	5,099,382	10,534,128	2,363,653,728	.....	2,545.75	1,832.00	319.93	
Average.....	.....	.....	.....	.....	.....	.....	.....	76.00	.....	.....	.....
Last year (1889).....	7,122.10	4,792.45	7,229.35	5,563,654	3,461,561	8,929,955	2,099,668,038	.....	2,254.31	1,801.00	320.30	
Average.....	.....	.....	.....	.....	.....	.....	.....	83.00	.....	.....	.....

No. 3.—SCHEDULE SHOWING THE WORK OF STEAM ENGINE No. 1.

MONTHS 1890.	Pump- ing time.	Revolu- tions.	Gallons pumped.	Coal used in lbs.			Pressure in air vessel.	IN POUNDS.				
				For pumping	For banking fires.	To raise 1,000,000 gallons.		Castor Oil.	Cylinder Oil.	Real Oil.	Coal Oil.	Cotton waste.
January	140.45	121,897	67,043,350	211,170	38,800	3,579	77	56.25	224.00	35.50	64.00	25.75
February	332.05	276,395	152,017,250	497,600	53,510	3,825	77	105.75	288.00	35.50	50.00	16.00
March	217.05	177,955	97,875,250	332,730	42,640	3,835	77	81.00	176.00	44.25	64.00	12.00
April												
May	19.00	15,677	8,632,850	28,410	6,660	4,068	80	9.0	16.00	.....	.....	10.00
June	136.35	113,402	62,371,100	210,950	26,690	3,810	81	47.25	112.00	.....	16.00	15.00
July	483.30	372,603	204,931,650	638,090	25,350	3,237	78	96.75	312.00	44.25	112.00	16.25
August	429.30	350,507	192,778,850	599,610	29,050	3,261	75	83.25	280.00	44.37	96.00	7.00
September												
October	343.50	268,360	147,598,000	487,010	20,710	3,440	76	81.25	241.00	53.25	136.00	10.00
November	244.10	176,224	96,923,200	300,410	24,550	3,353	73	51.66	176.00	35.50	112.00	14.00
December	189.05	147,239	80,981,450	266,300	30,000	3,659	76	40.50	152.00	35.50	48.00	12.00
Total	2,535.35	2,020,259	1,111,142,450	3,572,280	287,960	.....	.....	652.66	1,977.00	328.12	704.00	138.00
Daily average.	.....	.....	.....	.....	.....	.....	77	.....	.....	.....	.....	.....
Total last year 89	2,515.20	2,001,275	1,100,701,250	3,866,890	310,330	.....	.....	96.81	2,232.00	333.62	928.00	170.13
Daily average.	.....	.....	.....	.....	.....	3,795	83	.....	.....	.....	.....	.....

[illegible]

No 5—SCHEDULE. Montreal Water Works, Low Level pumping station, Gallons pumped 1890.

MONTHS 1890.	By Water Power.				By Steam Power.		Total for each month.				Per-centage		Average level of water.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By water.	By steam.	By water & by steam.	By water.	By steam.	At head of Aqueduct.	In front of wheels.
January....	133,172,548	84,712,536	56,423,076	75,652,222	67,043,350.	.....	349,960,382	67,043,350	417,003,732	83.92	16.08	38.96	36.00
February ..	116,464,351	75,930,068	4,638,468	39,207,314	152,017,250	.....	236,240,201	152,017,250	388,257,451	60.84	39.16	38.56	36.00
March	140,065,387	84,009,536	43,837,008	82,094,310	97,875,250	1,184,612	350,006,241	99,059,862	449,066,103	77.94	22.06	38.99	36.34
April	143,964,642	85,878,480	82,736,420	88,547,062	.....	.....	401,146,604	.....	401,146,604	100.00	.....	40.27	37.36
May	148,144,429	85,317,708	85,030,440	93,134,560	8,622,350	.....	411,627,137	8,622,350	420,249,487	97.95	2.05	41.51	37.25
June	144,486,096	78,076,956	82,086,572	91,007,780	62,371,100	102,896	395,657,404	62,473,996	458,131,400	86.36	13.64	41.71	37.28
July	90,769,111	44,746,764	49,706,392	60,829,692	204,931,650	32,725,724	246,051,959	237,657,374	483,709,333	50.87	49.13	40.02	35.16
August	116,771,911	57,219,908	45,554,548	74,189,104	193,778,850	7,462,140	293,735,471	200,240,990	493,976,461	59.46	40.54	39.14	35.55
September ..	143,378,647	68,547,828	83,795,232	84,143,260	.....	69,577,752	379,864,967	69,577,752	449,442,719	84.52	15.48	38.99	36.96
October	119,153,404	38,569,540	72,098,940	70,654,848	147,598,000	18,985,184	300,476,732	166,583,184	467,059,916	64.33	35.67	38.42	36.56
November....	120,395,760	.....	74,042,772	71,324,960	96,923,200	44,154,592	265,763,492	141,077,792	406,841,284	65.32	34.68	38.50	37.24
December..	134,502,745	.....	74,738,668	75,150,756	80,981,465	55,636,652	284,392,169	136,618,102	421,010,271	67.55	32.45	38.72	36.00
Total	1,551,269,031	703,009,324	754,708,536	905,935,868	1,111,142,450	229,829,552	3,914,922,759	1,340,372,002	5,255,894,761	74.49	25.51	39.48	36.47
Daily Aver.	4,250,652	1,926,052	2,067,695	2,482,016	3,044,236	629,670	10,725,816	3,673,896	14,399,712	.....	.....	.....	.....
Total, 1889.	1,383,211,731	823,380,536	512,311,028	763,976,474	1,10,0701,250	110,646,336	3,482,879,761	1,211,347,586	4,694,227,347	74.92	25.08	38.52	36.32
Daily Aver.	.....	.....	.....	.....	.....	.....	9,542,136	3,318,761	12,860,897	.....	.....	.....	.....

No. 6.—SCHEDULE SHOWING THE WORK OF ENGINE No. 1 (WORTHINGTON) AT THE HIGH LEVEL PUMPING STATION.

MONTHS 1890.	Pump- ing time.	Revolu- tions.	Gallons pumped.	Coal used in pounds.			Average pressure on pump piston.	Castor Oil	Valve- line, waste.	Cotton waste.
	Hrs. M.			For pumping	For banking fires.	To raise 1,000,000 gallons.				
January	142.00	212,762	2,553,144	27,163	2,471	11,606	100	.....	68.00	20.00
February .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	50.00	50,634	607,608	12,135	2,526	24,131	.....	2.00	29.00	6.00
June	12.00	11,038	132,456	1,576	240	13,710	100	6.00	2.00	.....
July .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
September .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
October .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
November .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
December .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	204.00	274,434	3,293,208	40,874	5,237	.....	.....	8.00	99.00	26.00
Average .....	.....	.....	.....	.....	.....	14,001	100	.....	.....	.....
Last year (1889)	56.30	128,476	1,541,712	8,581	1,665	.....	.....	.....	25.00	8.00
Average " .....	.....	.....	.....	.....	.....	6,646	.....	.....	.....	.....

No. 8.—Schedule showing the depth of water, the rain fall and the average temperature at 9 a. m. at McTavish St. Reservoir.

MONTHS 1890.	Average monthly depth in feet.	Rain gauges, in inches.				Average temperature at 9 a. m.
		Rain.	Snow.	Snow reduced to rain.	Total rain.	
January	22.43	1.63	28.25	2.26	3.89	15
February.....	22.27	2.41	36.00	2.47	4.88	19
March.....	22.54	1.28	9.25	1.15	2.43	26
April	22.71	1.19	0.50	0.35	1.54	43
May	22.32	4.25	.....	.....	4.25	53
June.....	21.70	2.49	.....	.....	2.49	65
July	18.97	2.39	.....	.....	2.39	69
August	21.01	7.65	.....	.....	7.65	65
September.....	21.65	3.18	.....	.....	3.18	57
October.....	13.94	2.57	.....	.....	2.57	46
November	20.43	0.97	6.75	0.85	1.82	35
December	22.36	0.03	24.00	2.22	2.25	9
Total 1890.....	21.02	30.04	104.75	9.30	39.34	41
Last year 1889.....	19.68	34.37	101.00	10.95	15.32	43

SCHEDULE No. 9.—REPAIRS &c., TO SERVICES.

Leaking over drains.	Couplings leaking	Brust in wall.	Cocks renewed	Wooden boxes replaced by iron ones.	Wooden boxes renewed where new footpath laid.	Services choked.	Old kind cocks replaced by pneumatic cocks.
110	46	57	50	306	550	94	18

Frozen outside.	Frozen inside.	Frozen in wall.	False reports investigated.	Leak on services from various causes undefined.
1	90	74	37	1018

New hydrants (old pattern) put in during year 1890	2
New hydrants (5 noz.) put in during year 1890	99
New patent hydrants in position up to January 1891 (3 noz.)	49
New patent hydrants in position up to January 1891 (2 noz.)	495
New patent hydrants (2 noz.) put in during year 1890 (new work).	51
New patent hydrants in position up to January 1891 (5 noz.)	254
Pneumatic valves put in during year 1890 (new work)	2692
Pneumatic valves put in up to January 1891 (new work and repairs).	12,965

HYDRANTS FROZEN DURING YEAR COMMENCING JAN. 1ST 90 ENDING DEC. 31ST 90.

January.	February.	March.	December.	Total hydrants frozen.
581	881	414	570	491 hydrants reported frozen 2444 times.

No 9A.—Schedule showing the Repairs done to Main Pipes, etc.—Continued.

POSITIONS.	Dates 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
Lusignan, North of Notre-Dame.	March 10	.....	.....	1	Put in new valve	Valve worn out.
St. Antoine, (last hydrant)	" 11	.....	.....	1	" "	" "
Pine and St. Famille	" 12	.....	.....	1	" "	" "
St. Lawrence and Mount Royal ..	" 13	.....	.....	1	" "	" "
St. James and St. Gabriel	" 14	.....	.....	1	" "	" "
Forrier and St. Constant	" 15	.....	.....	1	" "	" "
St. Alexander and Bernard	" 17	.....	.....	1	" "	" "
Ottawa and Prince	" 18	.....	.....	1	" "	" "
Bleury and Concord	" 20	.....	.....	1	" "	" "
Guy, at Canal	" 22	.....	.....	1	" "	" "
Craig, at St. Francois-Xavier	" 23	.....	.....	1	" "	" "
Ontario, near St. Urbain	" 24	.....	.....	1	" "	" "
Dorchester and Amherst	" 25	.....	.....	1	" "	" "
Craig and Panet	" 26	.....	.....	1	Recaulked joint	Joint blown out.
William and McCord	" 27	.....	.....	1	" "	" "
Notre-Dame and Parthenais	" 28	.....	.....	1	Put new valve	Valve worn out.
St. Dominique, near Craig	" 28 1/2	.....	.....	1	Recaulked joint	Joint blown out.
St. Antoine, near Little Craig	" 29 1/2	.....	.....	1	" "	" "
Notre-Dame and Richmond	April 3	.....	.....	1	Put in new valve	Not broken by frost.
Notre-Dame and Parthenais	" 4	.....	.....	1	Recaulked joint	Joint blown out.
Canal and Etienne	" 5	.....	.....	1	Put in new valve	Valve worn out.
St. Antoine and Lusignan	" 7	.....	.....	1	" "	" "
Roy and Hypolite	" 8	.....	.....	1	" "	" "
St. Constant, near Mignonne	" 9	.....	.....	1	" "	" "
St. Urbain and St. Jean-Baptiste ..	" 10	.....	.....	1	" "	" "
Cadeux and Roy	" 10	.....	.....	1	" "	" "
St. Urbain, above Dorchester	" 10	.....	.....	1	" "	" "

Montmorency and Canal.....	April	11	.....	.....	Put in new valve	.....	Valve worn out.
Lagauchetière and Margat.....	"	12	.....	.....	"	.....	"
St. Martin, below St. Antoine.....	"	14	.....	.....	"	.....	"
St. James and Dominion.....	"	15	.....	.....	"	.....	"
Jacques Cartier above Dorchester	"	16	4"	.....	Put in a new piece	.....	Cause unknown
Amherst and Rachel.....	"	17	.....	.....	Put new valve cover.....	.....	Broken by heavy load., &c.
Durocher Street.....	"	18	4"	.....	Recalked joint.....	.....	Joint blown out.
Sherbrooke, past Mark.....	"	19	.....	.....	Put in new valve	.....	Rod broken by frost.
Dorchester and Windsor.....	"	21	.....	.....	"	.....	"
Roy and Hypolite.....	"	22	.....	.....	"	.....	Valve worn out.
Baile and Mark.....	"	23	.....	.....	"	.....	"
Dalhousie Square.....	"	24	.....	.....	"	.....	"
Panet and Allard.....	"	25	6"	.....	Recalked joint.....	.....	Joint blown out.
Metcalfe, above Burnside.....	"	26	6"	.....	"	.....	"
Fullum, above Ontario.....	"	28	6"	.....	"	.....	"
St. Dominique, above Courville.....	"	29	4"	.....	"	.....	"
Opp. 184 Amherst.....	"	30	1"	.....	"	.....	"
Dorchester and St. Constant.....	"	30	10"	.....	Put in new valve	.....	Valve worn out.
Notre-Dame and Jacques-Cartier.....	May	1	.....	.....	"	.....	"
Ontario and Berri.....	"	2	.....	.....	Recalked joint.....	.....	Joint blown out.
Ontario, opp. McDonald's Factory	"	3	24"	.....	Put in a piece.....	.....	Corroded through.
St. James, North of Victoria.....	"	5	4"	.....	Put in new valve.....	.....	Valve worn out.
Craig and St. Hubert.....	"	6	.....	.....	Recalked joint.....	.....	Joint blown out.
Parthenais, at Female Jail.....	"	7	4"	.....	Cutting out 10" not used.....	.....	Pipe abandoned.
St. Catherine and St. Denis.....	"	8	10"	.....	Put in new valve.....	.....	Valve worn out.
St. Frs.-Xavier and St. Sacrament	"	9	.....	.....	Recalked joint.....	.....	Joint blown out.
German, near Vitre.....	"	10	4"	.....	Put in new valve	.....	Valve worn out.
Roy and Drolet.....	"	12	.....	.....	"	.....	"
Dorchester, near Wolfe.....	"	12	.....	.....	"	.....	"
Canning, below St. Antoine.....	"	12	.....	.....	"	.....	"
Guy, South of William.....	"	13	.....	.....	"	.....	"
Craig and Voltigeurs.....	"	14	.....	.....	"	.....	"
St. James and Fulford.....	"	14	.....	.....	"	.....	"
Aqueduct, at Crossing.....	"	15	4"	.....	Recalked joint.....	.....	Joint blown out.
Visitation and Logan.....	"	16	.....	.....	Put in new valve.....	.....	Valve worn out.

No. 9A.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1890.

POSITIONS.	Dates 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
Elizanne and Canal.....	May 17	.....	.....	1	Put in new valve.....	Valve worn out.
Rob'n Lane.....	" 18 1/2"	.....	.....	.....	Recalked joint.....	Joint blown out.
Osborne and Win'isor.....	" 18 6"	.....	.....	.....	Cutting off connection from H. L. on	.....
Opp. 108 Prince Street.....	" 19 1"	.....	.....	.....	Recalked joint..... [12" main.	Joint blown out.
St. Catherine's, at McGill College..	" 20 24"	.....	.....	1	Put drain to valve chamber, no drain	.....
Des'ry Street.....	" 21 1"	.....	.....	1	Put new spindle..... [before.	Thread worn off.
St. Urbain, at Hôtel-Dieu.....	" 22	.....	.....	1	Recalked joint.....	Joint blown out.
St. Vincent and Thérèse.....	" 23	.....	.....	.....	Put in new valve.....	Valve worn out.
St. Félix, South of Albert.....	" 23 1"	.....	.....	.....	Recalked joint.....	Joint blown out.
St. Jean-Baptiste and Hypolite.....	" 24	.....	.....	1	Put in new valve.....	Valve worn out.
Mill, near drinking Tap.....	" 24 4"	.....	.....	.....	Put in new piece.....	Broken by frost.
Sherbrooke, opposite Redpath.....	" 25	.....	.....	.....	Took out hydrant.....	Hydrant opposite door.
Wellington, corner St. Patrick.....	" 25	.....	.....	1	Put in new valve.....	Valve worn out.
Canal and Etienne.....	" 26	.....	.....	1	" "	" "
Amherst and Craig.....	" 26 20"	.....	.....	.....	Recalked joint.....	Joint blown out.
Albert, at Masterman's.....	" 27	.....	.....	1	Put in new valve.....	Valve worn out.
St. Constant and Ontario.....	" 28 4"	.....	.....	.....	Recalked joint.....	Joint blown out.
Pine and Redpath.....	" 29 12"	.....	.....	.....	Put in new piece .. 1/2 ..	Pipes blown out.
Mackay, above Dorchester ..	" 29	.....	.....	1	Put in new valve.....	Valve worn out.
Dorchester, corner Papineau.....	" 30	.....	.....	.....	Took away hydrant not required.....	.....
Lagauchetière and Amherst.....	" 30 6"	.....	.....	1	Put in spindle.....	Spindle broken.
Craig and Voltigeurs.....	" 30 6"	.....	.....	.....	Recalked joint.....	Blown out.
Dalhousie, opp. 165.....	" 31 6"	.....	.....	.....	Put in new piece.....	Cause unknown.
Richmond and William.....	" 31 6"	.....	.....	1	Stuffing box leaking repacked valve..	.....
Hypolite and Courville.....	June 2	.....	.....	1	Put in new valve.....	Valve worn out.
Dalhousie, below Ottawa.....	" 3	.....	.....	1	Recalked joint.....	Joint (of bydt.) blown out.
Burnside and Peel.....	" 4	.....	.....	1	Put in new valve.....	Valve worn out.

N o. 9A.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1890.

POSITIONS.	Dates 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
Notre-Dame and Versailles ..	.....	.....	.....	1	Put in new valve.....	Valve worn out. [sewer cut.
St. Denis, near Vitre.....	.....	10".....	.....	.....	Put in new piece.....	Broken by str'n of earth from
Marlbrough Street.....	.....	6".....	.....	.....	".....	Main split driving nozzle.
Lagauchetière and Jac. Cartier...	.....	6".....	1	.....	Put in a new valve.....	Spindle worn out.
Dorchester and St. Constant.....	.....	.....	.....	1	Put in new valve.....	Valve worn out.
Atwater Av., S. S. River St. Pierre	July 3	.....	.....	.....	Recaulked joint.....	Joint blown out.
Opposite 193 Centre.....	" 3	30".....	.....	.....	".....	"
King St., at Brush's.....	" 3	32 1/2".....	.....	1	Put in new valve.....	Valve worn out.
Moutmorenci, near St. Patrick ..	" 4	32 1/2".....	.....	.....	Recaulked joint.....	Joint blown out.
McCord and I Smith.....	" 5	.....	.....	1	".....	Valve worn out.
St. Alexander and Bernard.....	" 7	.....	.....	.....	".....	"
Sherbrooke and St. Mathew.....	" 8	8".....	1	.....	Put in new spindle.....	Spindle worn out.
Tupper and St. Mark.....	" 9	.....	.....	1	Put in new valve.....	Valve worn out.
Wellington and Colborne.....	" 9	.....	.....	.....	".....	"
Cadieux and Mary Ann.....	" 9 10	.....	.....	1	Recaulked joint.....	Joint Blown out.
Opp. 807 Notre-Dame.....	" 10	.....	.....	.....	Put in new valve.....	Valve worn out.
St. James and Fulford.....	" 11	.....	.....	.....	".....	"
Vitré and Coté.....	" 12	.....	.....	.....	".....	"
Guy, South of William.....	" 14	.....	.....	1	Replaced rod and valve.....	Rod too short.
Little Craig Street.....	" 14	.....	.....	.....	Stuffing box leaking repacked valve.	Packing worn out.
St. Famille and Bagg.....	" 15	.....	1	.....	".....	"
Craig and Busby.....	" 15	.....	.....	.....	Put in new valve.....	Valve worn out.
William and Richmond.....	" 16	.....	.....	1	Changing position of hydrant.....	Not in a good position.
St. Catherine, above Iberville.....	" 16	.....	.....	.....	Replaced rod and valve.....	Rough usage.
Lagauchetière and Bleury.....	" 17	.....	.....	.....	".....	"
Lagauchetière and Geneviève.....	" 18	.....	.....	.....	".....	"
Wellington and Magdalen.....	" 18	.....	.....	.....	".....	"

Montmorenci, near St. Patrick	July	10:24"	...	Put in a new piece.....	...	piece blown out.
Roy and Drolet.....	"	10	...	Replaced rod and valve.....	...	tough usage.
Ontario and St. Constant	"	23	...	Put new iron valve frames.....	...	(Paving) to replace stones.
William and Richmond	"	23	...	Raised valve stone.....	...	"
Parthenais and Ontario	"	23	...	"	...	"
St. Dominique, N. S. Mignonne..	"	17	...	"	...	"
St. Dominique and Courville	"	24	...	Recalked joint of hydrant.....	...	By hydrant shoved.
Ontario and St. Constant	"	24	...	Put in new valve.....	...	Valve worn out.
Common and Queen	"	25	...	"	...	"
Common and King.....	"	25	...	"	...	"
Wellington and Magdalen	"	26 4"	...	Stuffing box leaking repacked valve..	...	Packing worn out.
Dubord and Sanguinet	"	26	...	Put new valve.....	...	Valve broken by stone.
St. Maurice and Dupré	"	27 6"	...	Stuffing box leaking repacked valve..	...	Packing worn out.
Fortification, at Garth's	"	27	...	Puddling around hydrant.....	...	Ground porous.
St. Alphonse Lane.....	"	28 4"	...	Recalked joint.....	...	Joint blown out.
St. Catherine and German	"	29	...	Rebuilt valve chamber.....	...	Old and defective.
William, near McCord	"	29	...	Lowering valve stones.....	...	For paving.
Mignonne and St. Hubert.....	"	31	...	Put in new valve.....	...	Valve worn out.
St. Lawrence and Ontario	Aug.	1	...	"	...	"
St. Maurice, past Dupré	"	2 4"	...	Put in new piece.....	...	Piece blown out.
Lagauchetière and Beaudry.....	"	4 6"	...	"	...	Corroded through.
St. James and Canning.....	"	4	...	Put in new valve.....	...	Valve worn out.
St. James and Aqueduct	"	5	...	"	...	"
St. Catherine, at McGill College ..	"	5 24"	...	Renewed valve chamber.....	...	Paving, &c.
St. Antoine and Cathedral	"	6 12"	...	Put new valve stone.....	...	Worn out.
St. Maurice and McGill.....	"	6 4"	...	"	...	"
Craig and Papineau	"	6 4"	...	Stuffing box leaking repacked valve..	...	Blown out.
Wheel House Yard.....	"	7 30"	...	Recalked joint.....	...	"
St. Dominique and Sherbrooke...	"	7 30"	...	Stuffing box leaking repacked valve..	...	Joint blown out.
Noire-Dame and Gain	"	7 10"	...	Recalked joint.....	...	Valve worn out.
Ontario and Jacques Cartier	"	8	...	Put in new valve.....	...	"
Lagauchetière and St. Denis	"	9	...	"	...	"
Sherbrooke and St. Dominique...	"	11	...	Put in column.....	...	Old one split by frost.
Fort, corner St. Luke.....	"	12 4"	...	Put in new piece.....	...	Broken over drain.

No. 9A.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1890.

POSITIONS.	Date 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
St. Catherine at No 5 Pico Station	Aug. 13	.....	.....	1	Put new drain to hydrant..	Connecting to new sewer.
Ontario and Sanguinet	" 14	.....	.....	1	Recaulked joint.....	Joint blown out.
St. Catherine, corner McGill Coll.	" 14 24"	.....	.....	1	Recaulked valve chamber.....	Old one rot'n and dangerous.
De La-y Street.....	" 15 10"	.....	.....	1	Recaulked joint.....	Joint blown out.
St. Andre and Ontario	" 15 4"	.....	.....	1	Stuffing box leaking repacked valve..	Valve packing worn out.
Shannon Street.....	" 16 4"	.....	.....	1	Recaulked joint.....	Joint blown out.
Colborne, near Smith	" 16 4"	.....	.....	1	"	"
Manufacturer, near Shearer	" 18	.....	.....	1	Put in new valve	Valve worn out.
St. Catherine and Champlain	" 18 6"	.....	.....	1	Stuffing box leaking repacked valve..	Valve packing worn out.
Notre-Dame and Galt.....	" 19 10"	.....	.....	1	Recaulked joint	Joint blown out.
Dorchester and Maisonneuve.....	" 19	.....	.....	1	Replaced rod	No bottom check.
Opposite No. 5 St. Catherine.....	" 20 4"	.....	.....	1	Bonnetted pipe.....	Unknown cause.
Brock and Notre-Dame.....	" 20 4"	.....	.....	1	Rebuilt valve chamber.....	Old one rot'n and dangerous.
St. Constant and Perreault	" 20 4"	.....	.....	1	Put band on pipe.....	Hole in main pipe.
Galg and Papineau.....	" 20 12"	.....	.....	1	Put iron covers instead stone	Paving, &c.
William and Canling	" 20 12"	.....	.....	1	"	"
Notre-Dame and Parthenais	" 20	.....	.....	1	Rebuilt valve chamber.....	Old one rotten.
St. Alexander and St. Catherine.....	" 20 4"	.....	.....	1	Put in new piece.....	Sunk when intercept'g sewer
L'Esplan, North of Notre-Dame.....	" 21 4"	.....	.....	1	Recaulked joint.....	Joint blown out.
William and Richmond	" 21	.....	.....	1	Put in new valve.....	Valve worn out.
St. James and Chaboillez Square.....	" 22	.....	.....	1	"	"
Ontario and St. Lawrence	" 23	.....	.....	1	"	"
Colborne, South of Wellington.....	" 25	.....	.....	1	"	"

St. Catherine and University.....	Aug.	27	Put iron frame over valve.....	Stone worn (paving &c.)
Victoria Square and St. James.....	"	28	Put in new hydrant.....	(Old one defective.
Belmont and Brunswick.....	"	28	Put in new valve.....	Valve worn out.
Hutchison and Sherbrooke.....	"	28	Put in new rod and valve.....	Rough usage.
Mackay and St. Catherine.....	"	29	Stumfing box leaking repacked valve.....	Valve leaking.
Berri, above Roy.....	"	30	Put in new valve.....	Paving, &c.
St. Catherine and McGill College.....	"	30	Changed stones for iron frames.....	Old worn out.
Notre-Dame and Iberville.....	"	30	Put new valve stones.....	Paving, &c.
St. Catherine and Dufréne.....	"	30	Raised valve stones.....	
Victoria and St. Catherine.....	"	30	Changed stones for iron frames.....	
Notre-Dame and Susan.....	"	30	" " " "	
Notre-Dame, opposite Gaol.....	"	30	" " " "	
Craig and Delorimier.....	Sept.	1	" " " "	For paving.
Notre-Dame, opposite Gaol.....	"	2	Rebuilt valve chamber.....	Old one rotten.
St. Catherine and Peel.....	"	2	Recalked joint.....	Joint blown out.
Park Avenue, last hydrant.....	"	3	Put new valve.....	Valve worn out.
Ann and Brennan.....	"	4	Recalked joint.....	Joint blown out.
St. Maurice, (last hydrant).....	"	5	Put in new valve.....	Valve worn out.
Dorchester, past Blourey.....	"	6	Recalked joint.....	"
Aqueduct and Dorchester.....	"	8	Rebuilt valve chamber.....	Old one rotten, paving.
St. Catherine and Mansfield.....	"	9	" " " "	"
Notre-Dame and Gaol.....	"	10	" " " "	"
St. Paul and Dzier.....	"	11	Put in new valve.....	Valve worn out.
Amherst, above St. Jean-Baptiste.....	"	12	" " " "	"
King, South of Wellington.....	"	13	" " " "	"
Notre-Dame and Gale.....	"	13	" " " "	"
St. Catherine and Guy.....	"	14	Took out hydrant.....	Not required.
Ontario and Harbour.....	"	14	Put in new valve.....	Valve worn out.
William and St. Martin.....	"	15	" " " "	"
Gain and Ontario.....	"	15	Put new valve stone.....	Worn out.
Mignonne and Harbour.....	"	16	" " " "	"
Ontario and Shaw.....	"	16	Rebuilt valve chamber.....	Old one rotten.
St. James and Aqueduct.....	"	17	Put iron frames over valves.....	For paving.
Notre-Dame and Fullum.....	"	17	" " " "	"
Young and Wellington.....	"	17	" " " "	"

No. 9A.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1890.

POSITIONS.	Dates 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
Christophe and St. Catherine.....	Sept. 17	17	1	1	Stuffing box leaking repacked valve..	Thread worn off.
St. Catherine and Aylmer	" 13 1/2"	13 1/2"	1	1	Put in new spindle.....	" "
King and Common.....	" 18 1/2"	18 1/2"	1	1	Stuffing box leaking repacked valve..	Old packing worn out.
Logan and Payneau.....	" 19 1/2"	19 1/2"	1	1	" " " "	" "
Dorchester and Guy	" 19 1/2"	19 1/2"	1	1	Put in new valve.....	Valve worn out.
Ontario and Harbour	" 20	20	1	1	" " " "	" "
St. James and Chaboillez.....	" 20	20	1	1	" " " "	" "
Notre-Dame and Fullum	" 20	20	1	1	Stuffing box leaking repacked valve..	Old packing worn out.
Harbour and Notre-Dame	" 21	21	1	1	Put in new valve.....	Valve worn out.
Notre-Dame and Brock.....	" 21	21	1	1	Put in new piece.....	Corroded through.
Opp. 119 Camj eau Street.....	" 22 1/2"	22 1/2"	1	1	Put in new valve.....	Valve worn out.
Chatham, below St. Antoine	" 22	22	1	1	Rebuilt hydrant chamber	Old one defective.
University and Cathcart.....	" 23	23	1	1	" " " "	" "
Albert and Felix.....	" 23	23	1	1	Raising valve stone.....	For paving.
Metcalfe and St. Catherine	" 24	24	1	1	Put iron covers over valve.....	" "
St. Catherine and Shaw	" 24	24	1	1	Recaulked joint.....	Joint blown out.
St. James and Windsor	" 25 1/2"	25 1/2"	1	1	Changed position of hydrants.....	Put a new line.
and Vitré	" 25 1/2"	25 1/2"	1	1	Stuffing box leaking repacked valve..	Valve worn out.

St. Catherine and Papineau.....	29	Put iron frame over valve.....	Stone worn, (paving).
Lacroix and Notre-Dame.....	28	Stuffing box leaking repacked valve.....	"
Roy and St. Lawrence.....	Oct.	Put in new spindle.....	Worn out.
Eleanor and William.....	31	Put in new rod and valve.....	Through usage.
Shannon, South of Ottawa.....	3	Put in new valve.....	Valve worn out.
Sherbrooke and Visitation.....	4	"	"
Notre-Dame and Dezery.....	4	"	"
Centre and St. Francis.....	1	stuffing box leaking repacked valve.....	"
Napoleon and St. Dominique.....	64	Recalked joint.....	Joint blown out.
St. Catherine and University.....	724	stuffing box leaking repacked valve.....	Packing worn out.
Logan and Harbour.....	76	Put in new valve.....	Valve worn out.
St. Lambert and St. James.....	8	Put iron frames over valves.....	Stone worn, (paving).
St. Catherine and Panet.....	8	"	"
Craig and Gair.....	8	"	"
Craig and Shaw.....	8	"	"
Opp. 40 Amherst Street.....	94	Plugged hole in main and strap.....	Corroded through.
Delorimier Avenue.....	104	Put in new spindle.....	Spindle worn out.
St. James and Felix.....	11	Put in new valve.....	Valve worn out.
Amherst and Mignonne.....	13	"	"
McCord, near Smith.....	14, 12	Recalked joint.....	Joint blown out.
Mill at Peck Benny's & Co.....	15	Enlarged meter chamber.....	Joint one too small.
Dufresne and St. Catherine.....	154	Recalked joint.....	Joint blown out.
D. Jorimier, near Ontario.....	16	Replaced rod and put new valve.....	Valve worn, no bottom check
St. Constant and Lagauchetière.....	176	Stuffing box leaking repacked valve.....	Packing worn out.
Brons Ion Lane.....	184	Recalked joint.....	Joint blown out.
St. Louis.....	20	Put iron frames over valve.....	Paving to be made.
Delorimier and St. Catheline.....	21	"	"
Lacroix and Notre-Dame.....	22	"	"
Lacroix and St. Louis.....	226	"	"
Papineau and St. Catherine.....	23 10	stuffing box leaking repacked valve.....	Packing worn out.
St. James and Mountain.....	24	"	"
St. Antoine and Guy.....	244	"	"
Gauthier and University.....	254	Put in new piece.....	Intercepting sewer.
German and St. Catherine.....	274	Recalked joint.....	Joint blown out.
Marlborough and St. Catherine.....	274	Put in new piece.....	Cause unknown.
Opp. 119 Centre Str. et.....	284	Recalked joint.....	Joint blown out.

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THE UNIVERSITY OF CHICAGO

五、六、七、八、九、十、十一、十二、十三、十四、十五、十六、十七、十八、十九、二十、二十一、二十二、二十三、二十四、二十五、二十六、二十七、二十八、二十九、三十、三十一、三十二、三十三、三十四、三十五、三十六、三十七、三十八、三十九、四十、四十一、四十二、四十三、四十四、四十五、四十六、四十七、四十八、四十九、五十、五十一、五十二、五十三、五十四、五十五、五十六、五十七、五十八、五十九、六十、六十一、六十二、六十三、六十四、六十五、六十六、六十七、六十八、六十九、七十、七十一、七十二、七十三、七十四、七十五、七十六、七十七、七十八、七十九、八十、八十一、八十二、八十三、八十四、八十五、八十六、八十七、八十八、八十九、九十、九十一、九十二、九十三、九十四、九十五、九十六、九十七、九十八、九十九、一百。

Calderwood and Wellington	Nov 1	28.0	Recessed joint	Joint blown out
John and Adams	Nov 1	28.4	Recessed joint	Joint blown out
Reid and Lagache	Nov 1	28.4	Recessed joint	Joint blown out
McDonald and Clark	Nov 1	28.4	Recessed joint	Joint blown out
McGowan and Simpson	Nov 1	28.4	Recessed joint	Joint blown out
McGowan and Simpson	Nov 1	28.4	Recessed joint	Joint blown out
St. Maurice, near Henry	Nov 1	28.4	Recessed joint	Joint blown out
Mountain and St. Antoine	Nov 1	28.4	Recessed joint	Joint blown out
Wellington and Chalmers	Nov 1	28.4	Recessed joint	Joint blown out
Sherbrooke and Metcalfe	Nov 1	28.4	Recessed joint	Joint blown out
Dorchester, opposite Dufferin Bk	Nov 1	28.4	Recessed joint	Joint blown out
Colborne, S. of Wellington	Nov 1	28.4	Recessed joint	Joint blown out
Gosford and Champ-de-Mars	Nov 1	28.4	Recessed joint	Joint blown out
Opposite 145 St. Andre	Nov 1	28.4	Recessed joint	Joint blown out
Chomedey and St. Luke	Nov 1	28.4	Recessed joint	Joint blown out
Dorchester and St. Constant	Nov 1	28.4	Recessed joint	Joint blown out
Noire-Dame, opp. Court House	Nov 1	28.4	Recessed joint	Joint blown out
St. Catherine and St. Constant	Nov 1	28.4	Recessed joint	Joint blown out
St. Catherine, at Philip Square	Nov 1	28.4	Recessed joint	Joint blown out
Commissioner's at Bon, Marche	Nov 1	28.4	Recessed joint	Joint blown out
Dorchester, past Sanguet	Nov 1	28.4	Recessed joint	Joint blown out
Dorchester and St. Lawrence	Nov 1	28.4	Recessed joint	Joint blown out
Lagauchet's and Monique	Nov 1	28.4	Recessed joint	Joint blown out
St. James and Felix	Nov 1	28.4	Recessed joint	Joint blown out
B. d'ath and Pine	Nov 1	28.4	Recessed joint	Joint blown out
ult and St. Lawrence	Nov 1	28.4	Recessed joint	Joint blown out

Delhouse, below Ottawa.	Nov.	29	Thawed sludge.....	Sludge frozen.
St. Urban and Sherbrooke	"	30 ⁴	Put in new piece.....	Main sunk in drain cut.
St. Famille and Pine	"	30	Thawed sludge.....	Sludge frozen.
Notre-Dame de Lourdes Avenue.	"	30	"	"
Dorchester and Mansfield.	"	30 ¹²	Recalked joint.....	Joint blown out.
St. Catherine and Closse	"	31	Put in new valve.....	Valve worn out.
Dorchester and Bishop	"	31	"	"
Chaboillez Square	"	31	"	"
Wellington and Congregation	"	31	"	"
Chatham and Payette	"	31	Put in new valve.....	Not required.
Champlain and Rose	"	31 ⁶	Recalked joint.....	Joint blown out.
Amherst, Ontario to Sherbrooke.	Dec.	1	Taking away old hydrants	Replaced.
Visitation, above Lafontaine	"	2	Put in new valve.....	Valve worn out.
Quiblier and Fort.....	"	3	Put valve stone.....	In place of wood cover.
Dorchester and Dominion Square	"	4 ⁶	Put new valve.....	Old one no good.
Verchères Avenue	"	5 ⁶	Put in new piece.....	Split by frost.
Argy's Avenue	"	6	Thawed sludge.....	Sludge frozen.
St. Catherine and Davidson	"	6	Put in new valve.....	Valve worn out.
Moreau, above Ontario	"	8	"	"
McGill College Grounds	"	9	"	"
Fulford and Delisle	"	10	"	"
St. Hubert, Dorchester to Ontario	"	10	Took out old hydrant	Replaced.
St. James and Windsor	"	11 ²⁴	Recalked joint.....	Joint blown out.
Inspector and M. tre-Dame	"	12 ⁴	Put in new spindle.....	Worn out.
Rivard and Mary Ann.	"	12	Put in new valve.....	Valve worn out.
Napléon and Pantaléon	"	1	"	"
Notre-Dame and Shaw.....	"	13	"	"
Wellington and St. Etienne	"	15	"	"
Wellington, past Mullin	"	15	"	"
I agau, hetière and St Dominique	"	16	"	"
Canning, at Crossing.....	"	17 ⁴	Recalked joint.....	Joint blown out.
St. Cathrine and Guy.....	"	19 ¹²	"	"
Cuthbert and St. Lawrence	"	20	Raised valve stone	Sunk.
Notre-Dame and St. Frs.-Xavier.	"	20 ⁴	Put in new spindle.....	Spindle broken.
Marlborough and St. Catherine	"	2	Put in new valve.....	Valve worn out.

Sludge frozen.
Main sunk in drain cut.
Sludge frozen.
" "
Joint blown out.
Valve worn out.
" "
" "
" "
Not required.
Joint blown out.
Replaced.
Valve worn out.
In place of wood cover.
Old one no good.
Split by frost.
Sludge frozen.
Valve worn out.
" "
" "
" "
Replaced.
Joint blown out.
Worn out.
Valve worn out.
" "
" "
" "
" "
Joint blown out.
" "
Sunk.
Spindle broken.
Valve worn out.

No. 9A.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1890.

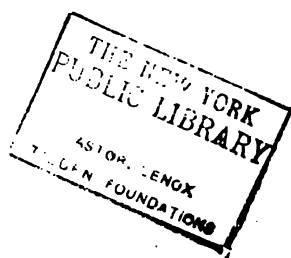
POSITIONS.	Dates 1890.	Mains.	Valves.	Hydrants.	HOW REPAIRED.	Probable causes of injury.
Aylmer and Mayor	Dec. 22	.....	.....	1	Put in new valve.....	Valve worn out.
Craig and St. François-Xavier ..	" 23	.....	.....	1	" "	" "
Mignonne and Sanguinet.....	" 23	.....	.....	1	Took out hydrant.....	Not required.
Inspector and St. Maurice	" 24	.....	.....	1	Building valve chamber.....	Instead of box.
St. Thérèse and Vincent Street —	" 24	.....	.....	1	Recaulked joint.....	Joint blown out.
Chaussé et Parthenais.....	" 24	.....	.....	1	Put in new hydrant.....	Old one split by frost.
Chenneyville and Dorchester	" 25	.....	.....	1	Stuffing box leaking repacked valve.....	Valve worn out.
University and Sherbrooke	" 26	.....	.....	1	Put in new valve.....	" "
Ottawa and Shannon	" 27	.....	.....	1	" "	" "
Ontario and Berri	" 29	.....	.....	1	" "	" "
St. Catherine and Beaudry	" 30	.....	.....	1	" "	" "
St. Peter and Foundling.....	" 31	.....	.....	1	" "	" "
St. Catherine, near Robb	" 31	.....	.....	1	" "	" "
Dorchester and St. Dominique ..	" 31	.....	.....	1	" "	" "

NTREAL.

1833

10,575,363
10,745,981
10,531,461
10,356,518
9,626,842
10,566,558
11,299,205
11,374,208
11,038,378
11,101,760
10,091,780
9,331,761

10,552,174
985,415
.....



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**No. 11.—SCHEDULE SHOWING THE METERS IN USE AND THOSE AT THE SHOP
FROM 1876 TO 1890.**

DATES.	Property of the Water Works				Property of Private Parties.				Grand Total.
	In the City.	Outside the City.	At the work shop.	Total.	In the City.	Outside the City.	At the work shop.	Total.	
1876.....	124	155	60	339	66	2	.....	68	407
1877.....	140	145	48	342	73	1	4	78	420
1878.....	223	16	111	350	72	1	4	77	427
1879.....	211	16	167	394	69	1	8	78	472
1880.....	224	12	178	414	68	1	8	77	491
1881.....	255	11	184	450	64	1	10	75	525
1882.....	298	9	175	482	62	1	11	74	556
1883.....	368	12	163	543	45	1	9	55	598
1884.....	411	10	184	605	46	1	10	56	662
1885.....	457	10	164	631	41	.....	14	55	686
1886.....	501	7	202	710	36	.....	17	53	763
1887.....	535	7	182	724	46	1	16	63	787
1888.....	556	6	204	766	52	2	16	70	836
1889.....	601	9	201	811	55	5	15	75	886
1890.....	628	6	286	920	57	2	59	979

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TECHNOLOGY

Name of consumers	Streets.	Description of establishment	Kind of meters.	Wm. H. H. Co.	Patented.	Paid by meter.	Illustration of meter.	Serial number.	Remarks.
Walter T.	Native, Dame	Photographers	Crown	700	.....	.....	.....	.....
William Robert	470 Dins heater	Shoe water	Union	400	.....	.....	.....	.....
Auld John	41 St. George	Clark audier.	"	147	.....	.....	.....	.....
Arnd, St. Le de Gonzague	405 St. Charles		Crown	830	.....	.....	.....	.....
Atkin John	St. Constant		"	640	.....	.....	.....	.....
Awend, St. Jean Baptiste	790 St. Augustin		"	677	.....	.....	.....	.....
"	Marie Rose		"	.....	.....	.....	.....	.....
"	Barbelle		"	.....	.....	.....	.....	.....
Atlot & Co.	215 DuFonbuier Av	Rolling Mills	Worthington	741	.....	.....	.....	.....
"	"	"	"	746	.....	.....	.....	.....
Atlet J. M.	309 St. Urbain St	Cumfustion	Crown	400	.....	.....	.....	.....
Avalle St. Joseph	541 St. James	"	"	614	.....	.....	.....	.....
Becheben	33 Richmond Sq	"	"	730	.....	.....	.....	.....
Ames Holden & Co.	43 Victoria Sq	Roof-manufacture	Union	261	.....	.....	.....	.....
American P. Church	104 Borchester	"	Worthington	711	.....	.....	.....	.....
Allan A.	106 McTavish	Gentlemen	Crown	360	.....	.....	.....	.....
"	"	"	"	360	.....	.....	.....	.....
Athlon Hotel	141 McGill	Hotel	Union	205	.....	.....	.....	.....
"	"	"	Camp.	647	.....	.....	.....	.....
Ayer & Co.	Wellington & McGill	Butler & silencer in	"	640	.....	.....	.....	.....
"	"	"	"	371	.....	.....	.....	.....
Baron's Block	102 St. James	Offices	"	483	.....	.....	.....	.....
"	"	"	"	872	.....	.....	.....	.....
Bel Telephone Co's	St. Frs. Xavier	"	Worthington	470	.....	.....	.....	.....
"	"	"	Gem.	637	.....	.....	.....	.....
Bell Telephone Co's	413 St. Paul	Warehouse	"	522	.....	.....	.....	.....
Bryson T. M. & Co.	LeFoyer	Dry goods	Crown	1030	.....	.....	.....	.....
Boussieu L. H. & Co.	5 DeBrennes	Brokers	"	948	.....	.....	.....	.....
Beauvais E. & Co.	LeFoyer Street	Stationers	"	418	.....	.....	.....	.....
Bentin A. & Co.	St. Jean-Baptiste	Importers	Gem.	.....	.....	.....	.....	.....
Bin & Duchesneau	St. Jean-Baptiste	Importers	"	.....	.....	.....	.....	.....

SCHEDULE 11a.—METERS IN OPERATION. DECEMBER 31st 1890—Continued.

Name of consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By assess-ment.	All by meter.	Engines.	Elevators.	Specials.
Caverhill, Kiscock & Binnmore	12 St. Alexes	Dry goods	2'	Gem		Private.	X					
Caverhill Learmont & Co	10 "	Hardware	2'	"	488		X				X	
Coristine J. & Co.	477 St. Paul	Furriers	1'	Crown	1024		X		X		X	
"	471 "	"	1'	"	576		X		X			
Chase & Sanborn	435 "	Importers	3'	Empire	862		X		X			
Chaput, Sons & Co.	St. Dezier	Grocers (wh'sale)	3'	Gem	177		X				X	
"	2 DeBresoles	"	4'	"	839		X				X	
Cassidy J. L. & Co.	LeRoy	Importers	3'	"	824		X				X	
Canadian Rubber C'y	St. Dezier	Manufacturers	3'	"	703		X				X	
"	4 & 6 Papineau R.	"	3'	"	873		X				X	
Congregation of N. Dame	40 St. Jean-Bte	Convent	1'	Union	143		X		X			
"	"	"	1'	Crown	529		X		X			
"	"	"	3'	"	389		X		X			
"	"	"	3'	"	931		X		X			
Catholic School Comm's	37 St. Denis	Academy	1'	"	609		X		X			
"	184 Craig	"	1'	Worthington	715		X		X			
Congregation of N. Dame	754 St. Catherine	"	1'	Crown	186		X		X			
Catholic school Comm's	156 Fullum	"	1'	"	273		X		X			
Congregation N. Dame	456 St. Urbain	"	1'	"	1005		X		X			
Canada Paper Co.	Fortification Lane	Manufacturers	1'	Empire	999		X		X			
Canada Bank Note Co.	526 Craig	Printers	2'	"	428		X		X			
Casson A. & fil...	Commissioners	Grocers	2'	Gem	956		X		X			
Cronins Miss	1428 Notre Dame	Academy	1'	Crown	1011		X		X			
Contu & Co.	1450 "	Manufacturers	1'	Empire	998		X		X			
Crawford D.	140 St. Urbain	Soap manuf.	1'	"	803		X		X			
Canada Cigar Box Co.	67 "	Box manuf.	1'	Worthington	604		X		X			
Chanteloup Estate	587 Craig	Founder	1'	Crown	219		X		X			
Christian Brothers	50 Coté	School	1'	Worthington	476		X		X			

Christian Brothers	School	4 th	Worthington	Private
144 Sherbrooke	"	"	Grown	102
119 St. Denis	"	"	Worthington	483
Oatholic School Comm.	"	"	Union	35
"	"	"	"	269
"	"	"	Grown	975
"	"	"	"	363
24 Roy	"	"	Union	290
Visitation	"	"	"	230
35	"	"	"	196
Cadeux	"	"	Empire	993
Gatholic school Commis	"	"	Worthington	Private
Chaput J.	"	"	Union	251
Christin J. & Co.	"	"	Notary Union	394
119 St. Denis	"	"	Union	633
Convent of the p. f. St. J. 1668 St. Catherine	"	"	Grown	571
Canada Steam Laundry	"	"	Union	107
"	"	"	"	284
79 Papineau Road	"	"	Grown	907
Cooper A.	"	"	Worthington	676
Canada Thread Co.	"	"	"	460
Canadian Brewing Co.	"	"	Empire	892
Chouinard J. J.	"	"	Union	625
120 Parthenais	"	"	Empire	1004
Carmelite Nunnery	"	"	Grown	681
Coghlin J. B.	"	"	"	339
330 Logan	"	"	"	781
C. P. Railway Co.	"	"	Worthington	616
"	"	"	Grown	853
"	"	"	Gem	480
"	"	"	"	778
"	"	"	Grown	933
Convent of the Good S.	"	"	"	581
"	"	"	"	788
"	"	"	"	842
"	"	"	Empire	1001
Charbonneau J.	"	"	Union	861
394 Montana	"	"	"	112
Cuthbert R. & Son	"	"	"	"
23 College	"	"	"	"
Clark	"	"	"	"
65	"	"	"	"

SCHEDULE 11a.—METERS IN OPERATION. DECEMBER 31st 1890.—Continued.

Name of consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By assessment.	All by meter.	Engines.	Elevators.
Canada Pu verizing Co...	88 Ann.	Manufacturers	1 1/2	Empire	953	.....	x	.....	.....	x	.....
Canada Furniture Co...	Colborne	"	1"	"	853	.....	x	.....	x	x	.....
Mea Pack'g Co...	Young	"	2"	"	871	.....	x	.....	x	.....	.....
Cowan J.....	3 Dalhousie	"	1 1/2	Union	119	.....	x	.....	x	.....	.....
Crathern & Caverhill...	Ann	Hardware	3"	Gem	772	.....	x	.....	x	.....	.....
"	13 Colborne	"	3"	"	745	.....	x	.....	x	.....	x x
Canada Horse Nail Co...	129 Mill	Manufacturers	1 1/2	Empire	928	.....	x	.....	x	.....	.....
Canada Sugar Refinery...	St. Patricks	Sugar refiners	4"	Union	868	.....	x	.....	x	.....	.....
"	"	"	1"	Crown	274	.....	x	.....	x	.....	.....
Consumers Cordage Co...	267	Rope Manuf.	1"	Worthington	689	.....	x	.....	x	.....	.....
Congregational Nuns...	15 Mullins	School	1 1/2	Crown	631	.....	x	.....	x	.....	.....
"	102 McCord	"	1 1/2	Worthington	908	.....	x	.....	x	.....	.....
"	2351 Notre-Dame	"	1 1/2	Crown	833	.....	x	.....	x	.....	.....
Catholic School Comm...	Grand Trunk	"	1 1/2	"	157	.....	x	.....	x	.....	.....
"	"	"	1"	"	386	.....	x	.....	x	.....	.....
"	245 Guy	"	1"	"	385	.....	x	.....	x	.....	.....
Christian Brothers	127 Young	Dwelling	1 1/2	Union	187	.....	x	.....	x	.....	.....
"	323 Richmond	"	1 1/2	"	175	.....	x	.....	x	.....	.....
"	St. Martin	School	1 1/2	"	39	.....	x	.....	x	.....	.....
Canada Jute Co...	17	Manufacturers	1 1/2	Worthington	456	.....	x	.....	x	.....	.....
Canin A.....	William	Can. mar. works.	1 1/2	"	545	.....	x	.....	x	.....	.....
Canada Galvanizing Co...	22 Latour	Manufacturers	1 1/2	Crown	932	.....	x	.....	x	.....	.....
"	"	"	1 1/2	Empire	991	.....	x	.....	x	.....	.....
Oree Scott & Co...	St. Sophie Lane	" shirts & collars	1 1/2	Crown	844	.....	x	.....	x	.....	.....
"	"	"	1"	"	845	.....	x	.....	x	.....	.....
"	"	"	1"	Empire	671	.....	x	.....	x	.....	.....
Crescent st. Preab. Ch...	Crescent	Church organ	3"	Crown	931	.....	x	.....	x	.....	.....
Church of Eng's. Home...	403 Guy	Home	1 1/2	"	985	.....	x	.....	x	.....	.....
Christ Church Cathedral	University	Church organ	2"	Worthington	861	x	x
Cadwell R. L.	St. James	Manufacturers	1 1/2	Crown	861	x	x

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Name	Address	Occupation	Age	Sex	Mar.	Rel.	Prof.	Test.	W. Pipes
Castile Ewan & Co.	13 St. Helen	Dry goods	31	M					
Cooper James	21 Normand	Manufacturers	31	M					
Canada Pipe & F. Co.	William	Founders	31	M					
Canadian Pacific R. Co.	Windsor	Railway Co.	41	M					
"	"	"	41	M					
"	"	"	41	M					
"	"	"	41	M					
Canada Switch Co.	Bison	Manufacturers	11	M					
Cote St. Antoine W., Co	St. Etienne	Water Company	11	M					
"	"	"	11	M					
Date J.	Fortification lane	Plumbers	11	M					
Duncan J. & Co.	450 St. Paul	Merchants	31	M					
Darling W.	30 St. Sulpice	Hardware	31	M					
Dubord A.	10 St. Amable	Manufacturer	31	M					
D'Amour C.	1 Place d'Arms	Agent	31	M					
Dominion S. G. Man. Co.	Champ de Mars	Manufacturers	11	M					
Darling Brady	96 St. Ch. Borromee	Soap manuf.	11	M					
Davis S. & Son	45 Cotté	Cigar manuf.	11	M					
Dominion Rink	185 St. Dominique	Skating rink	11	M					
Dupuis Frères	St. André	Dry goods	41	M					
Donnelly P.	Perthus	Saw millers	31	M					
Dominion Oil Cloth Co.	858 St. Catherine	Manufacturers	31	M					
Deaf & Dumb Institution	Berri	Asylum	21	M					
"	399 St. Denis	"	11	M					
"	"	"	11	M					
"	"	"	11	M					
Darling Bros.	112 Queen	Machinists	11	M					
Dominion Transport Co.	Dalhousie	"	11	M					
Dawes & Co.	521 St. James	Bottling dept.	11	M					
"	Cathedral	"	11	M					
"	St. Margaret	"	11	M					
Dow & Co.	2056 Notre Dame	Brewing	41	M					
"	Colborne	"	21	M					
"	Notre Dame	"	11	M					
"	Colborne	"	21	M					
"	Notre Dame	"	11	M					
"	Colborne	"	11	M					
Dominion Steam Laundry	2435 Notre Dame	Laundry	11	M					
Davis Lawrence & Co.	Chatham	Druggists	11	M					

Particulars	Amount	Description of establishment	No. of machines	Kind of machine	No. of machines	Private	Paid by meter	By assessment	All by meter	Engines	Elevators	Specials
<i>Union Type B, 15 x 17</i>	750	Crane	1	Crown	751	.....	x	.....	.....	.....	.....	Motor.
<i>Wright & Co., 15 x 17</i>	43 84	Jeans Exp.	1	Worthington	270	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	43 84	Jeans Exp.	1	Empire	1006	.....	x	.....	x	.....	x	.....
<i>Wright & Co., 15 x 17</i>	44	Fortification	3	Gem	883	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	84	Elizabeth	1	Empire	174	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	409	St. Lawrence	1	Union	870	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	760	Notre Dame	1	Worthington	816	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	109	Duke	1	Crown	588	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	41	Beaver Hall	1	Worthington	614	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	Stanley	Church	2	Empire	802	.....	x	.....	.....	x	.....	Laundry.
<i>Wright & Co., 15 x 17</i>	Ped.	.....	2	Gem	865	.....	x	.....	.....	.....	.....	Organ motor
<i>Wright & Co., 15 x 17</i>	89	McGill	2	Worthington	434	.....	x	.....	.....	.....	x	.....
<i>Wright & Co., 15 x 17</i>	43	St. Sacrement	1	Worthington	742	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	46	.....	4	Gem	265	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	15	Hospital	3	Empire	813	.....	x	.....	.....	x	.....	Boiler & washing [boilles.
<i>Wright & Co., 15 x 17</i>	111	Commissioners	3	Gem	704	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	Fronteac	Manufacturers	3	Worthington	208	.....	x	.....	x	.....	.....	Not paid for.
<i>Wright & Co., 15 x 17</i>	357	St. James	3	Gem	768	.....	x	.....	.....	.....	x	.....
<i>Wright & Co., 15 x 17</i>	22	College	1	Union	135	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	Ann	Manufacturers	1	Empire	1034	.....	x	.....	x	.....	.....	.....
<i>Wright & Co., 15 x 17</i>	27	Victoria	3	Gem	672	.....	x	.....	x	.....	x	.....
<i>Wright & Co., 15 x 17</i>	1018	Sherbrooke	3	Crown	947	.....	x	.....	.....	.....	.....	For a motor not used.
<i>Wright & Co., 15 x 17</i>	Fortification	Machinists	1	Gem	1018	.....	x	.....	.....	.....	.....	While white in
<i>Wright & Co., 15 x 17</i>	Notre Dame	Importers	4	Crown	733	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	Basin	Marble works	1	Empire	821	.....	x	.....	.....	x	.....	.....
<i>Wright & Co., 15 x 17</i>	1	St. Sacrement	1	.....	.....	.....	.....	.....	.....	.....	.....	.....

[illegible]

Hingham Bay.	St. Catherine.	Plasterers	Continental	Private	Gas engine.
Harbour Commissioners	27 Common	Board rooms	2" Gem	446	Special
Jonas H. & Co	Le Royer	Agents & Importers	1" Crown	832	
Imperial Ins	Fortification Lane.	Insurance	1" Empire	854	
Jac Cartier Hotel.	27 Jac Cartier sqr.	Hotel	2" Crown	178	
" Normal school.	Sherbrooke	School	2" "	693	
Ives & Co	113 Queen	Founders	1" "	84	
"	"	"	1" Empire	889	Engine & grind-
Johnston N. & Co.	572 William	Paints & c	1" Crown	864	stone.
Jesuits Church.	Bleury	Church	2" "	667	Specials.
Jensen J	706 Craig	Royal dye works.	2" Gem	447	Electric plating.
"	Fortification	"	1" Union	193	Motor for organ.
"	"	"	1" Union	990	
Jacobs W	21 Hermine.	Livery	1" Crown	185	
Johnston J.	Recoll t	Dry goods	2" Gem	391	
Kerry Watson & Co.	Le Royer.	Druggists	3" "	427	
"	23 St. Jean Bte.	"	1" Worthington	780	For the stable.
"	"	"	1" Crown	514	
"	"	"	1" Worthington	665	
Kendal G. H. & Co.	623 Lagauchetière.	Novelty work	1" Private	544	
King Warden & Son	St. George	Founders	1" "	688	
Keller F	107 Shearer	Furrier	1" Empire	893	
Know Church	Mansfield	Church	2" Gem	413	
Know J. & Son	23 St. Nicholas	Printers	1" Worthington	568	
Kovin B. & Co.	491 St. Paul	Furriers	3" Gem	767	Motor for organ.
Lake of the Woods M. Co	4 Port	Millers	3" "	440	
Lyman Sons & Co	386 St. Paul	Druggists	1" Crown	471	
"	382	"	1" Union	10	
"	St. Sulpice	"	3" Gem	223	
"	9 DeBroses	Paints & c	3" Union	182	
Lacaille C. & Co	12 St. Dizier	Grocers	3" Gem	438	
Le Monde	1650 Notre Dame	Printing	1" Union	294	
Laval University	45 Jac Cartier sqr.	University	1" Worthington	618	
"	"	"	1" Union	235	
Larin A	50 St. Ch. Bor'mée.	Livery	1" Worthington	180	
Lapham Aros.	1 St. Philippe	Cabinet makers	1" Worthington	512	
Lafonde D.	1000 St. Lawrence.	Saw mill	1" Empire	863	

SCHEDULE 11a.—METERS IN OPERATION, DECEMBER 31st 1890.—Continued.

Name of consumer.	if consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By assessment.	All by meter.	Engines.	Elevators.	Specials.
M. & Co		3 St. Rose	Manufacturers	1 1/2	Crown	865		x		x			
"		Papineau road.	"	1 1/2	Worthington	475		x		x			
"		8 St. Rose	"	1 1/2	Union	252		x		x			
Lamarche & Gagnon		Josaphat lane	Wood Cutters	1 1/2	Empire	805		x		x			
Laing M. & Sons		95 Parthenais	Butchers	1 1/2	"	902		x		x			
Lapierre & Paquette		573 Notre Dame	Sawmills	1 1/2	"	807		x		x			
Lefebvre A. & Co.		244 St. Henry	Soda water	1 1/2	Crown	723		x		x			
Lachine Canal		Mill	Workshop	1 1/2	Worthington	502		x		x			
Larmonth & Co.		260 Mullins	Machinists	1 1/2	Crown	502	Private.						
Liggett & Hamilton		1884 Notre Dame	Dry goods	4 1/2	Gem	203		x		x			
Labbe G. H. & Co		445 St. James	Furniture	4 1/2	"	836		x		x			
Lymburner & Mathews		21 St. David lane	Founders	1 1/2	Empire	896		x		x			
Linton J. & Co		37 Victoria sq.	Boots & shoes	1 1/2	Worthington	675		x		x			
Leslie James		Craig & St. Ant.	Belting & c.	1 1/2	"	493		x		x			
Lang Manuf. Co.		16 St. Monique	Biscuit manuf.	1 1/2	"	680		x		x			
Ladies Benevolent.		31 Berthelet	Institution	1 1/2	Crown	657		x		x			
"		"	"	1 1/2	Worthington	539		x		x			
Larivière A. N. C		St. Margaret.	Planing mill	1 1/2	"	464		x		x			
Murphy J. & Co		1781 Notre Dame	Dry goods	4 1/2	Gem	526		x		x			
Morton Phillips & Co		1755 "	Printers	3 1/2	"	320		x		x			
"		"	"	1 1/2	Crown	739		x		x			
Mackenzie J. G. & Co.		381 St. Paul	Dry goods	2 1/2	Gem	435		x		x			Gas engine.
Mongenaix Boivin & Co.		170 Commissioners	Merchants	5 1/2	"	701		x		x			
"		105 "	"	1 1/2	Crown	726		x		x			

PERCHELLO, C. - MITHRA - CREATION, DESTRUCTION - Continued

Name of owner, trade	Kind of motor	Price	Paid by	Warrant	By	Motor	Kingdon	Clowndon	Specials
1st Crown	500	Private	X	X	X	X	X	X	
1st Empire	400	Private	X	X	X	X	X	X	
1st Gem	400	Private	X	X	X	X	X	X	
2nd Empire	800	Private	X	X	X	X	X	X	
3rd Crown	800	Private	X	X	X	X	X	X	
1st Crown	1928	Private	X	X	X	X	X	X	
1st Crown	736	Private	X	X	X	X	X	X	
1st Empire	604	Private	X	X	X	X	X	X	
2nd Gem	1012	Private	X	X	X	X	X	X	
1st Empire	811	Private	X	X	X	X	X	X	
2nd Gem	851	Private	X	X	X	X	X	X	
3rd Gem	746	Private	X	X	X	X	X	X	
Worthington	905	Private	X	X	X	X	X	X	
Empire	1044	Private	X	X	X	X	X	X	
2nd Worthington	474	Private	X	X	X	X	X	X	
1st Crown	910	Private	X	X	X	X	X	X	
Union	247	Private	X	X	X	X	X	X	
Gem	349	Private	X	X	X	X	X	X	
1st Crown	570	Private	X	X	X	X	X	X	
1st Union	136	Private	X	X	X	X	X	X	
Crown	409	Private	X	X	X	X	X	X	
2nd College	652	Private	X	X	X	X	X	X	
2nd Seminari	400	Private	X	X	X	X	X	X	
2nd Florist	909	Private	X	X	X	X	X	X	
1st Hairdresser	735	Private	X	X	X	X	X	X	
1st Founders	850	Private	X	X	X	X	X	X	
1st Dry goods	792	Private	X	X	X	X	X	X	
3rd Gem	776	Private	X	X	X	X	X	X	
4th Institute			X	X	X	X	X	X	
27 St. Antoine									
69									
00 Windsor									
326 Guy									
27 St. Antoine									
69									
00 Windsor									
326 Guy									
27 St. Antoine									
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326 Guy									
27 St. Antoine									
69									
00 Windsor									

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SCHEDULE 11a.—METERS IN OPERATION, DECEMBER 31st 1890—Continued.

Name of consumers.	Streets.	Description of Establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By assess-ment.	All by meter.	Engines.	Elevators.	Specials.
New Eng. Paper Co.	21 DeBresolles.	Man facturers	3 ¹¹	Gem	874	Private.	x				x	
New York Life Ins Co.	St. James	Insurance.	3 ¹¹	Crown	598					x		
Notre Dame Church	Notre Dame	Church.	3 ¹¹	Gem.	765							Organ motor.
"	"	"	3 ¹¹	"	1031							
Notre Dame Hospital.	1429 "	Hospital.	3 ¹¹	Crown	517				x			
"	"	"	1 ¹¹	Worthington	287							
"	"	"	2 ¹¹	Union	624							
Notman & Son.	Chimp de Mars.	"	3 ¹¹	Crown	797							
"	17 Bleury.	Photographers.	3 ¹¹	"	758							
"	"	"	3 ¹¹	"	800							
Nazareth Asylum.	2009 St. Catherine.	Home	3 ¹¹	"	585							
"	2023 "	"	3 ¹¹	Gem	978	Private.						Office &c.
New City Gas Works	177 Harbour	Gas works	3 ¹¹	Crown	979							
"	"	"	3 ¹¹	"	464							
"	Ottawa	"	1 ¹¹	Gem	415							
"	Dalhousie	"	3 ¹¹	Crown	761							Organ motor.
New Methodist Church.	St. Catherine.	Church.	3 ¹¹	Gem	762							
Nordheimer Bros.	213 St. James.	Office.	3 ¹¹	"	838						x	
"	"	"	2 ¹¹	"	414							Organ motor.....
Olivet Bapt. Church.	183 Mountain	Church.	3 ¹¹	"	523							
O'Brien J.	Kadegonde	Clothiers	3 ¹¹	"	669						x	Livery.
Osborne S.	77 Burnside.	Livery	1 ¹¹	Crown	354							Small motor.
Palmer & Son	1745 Notre Dame.	Hairdresser.	1 ¹¹	"	850							Motor for grind-
Parisian Optical Co.	35½ Lambert's H.	Optician.	1 ¹¹	Empire	858							stone.
Perrault Printing Co.	St. James	Printing &c.	1 ¹¹	Union	989					x		
"	"	"	1 ¹¹	"	116							
Protestant School Comrs.	600 Lagache.	School Commis	1 ¹¹	Crown.	627							
"	347 St. Dominique.	"	1 ¹¹	"								

[illegible]

SCHEDULE 11a.—METERS IN OPERATION, DECEMBER 31st 1890.—Continued.

Name of consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private	Pay by meter	By assess-ment.	Ruglines	Elevators	Specials
Rolland J. B. & Fils.....	8 St Vincent	Stationers	3 7/8	Gem.	674		X			X	
Richelieu Hôtel.....	14 "	"	3 7/8	"	648					X	
"	43 "	Hotel	1 7/8	Worthington	448						
Royal Insurance	Notre Dame	Insurance	4 7/8	Crown	1025						
Robitaille A. & Co	Jacques Cartier	Grocers	2 7/8	Gem.	191					X	
Rondeau J.....	50 " 84	Hotel	1 7/8	Crown	1015					X	
Rheault Bros.....	50 St. Dominique	Carvers & gilders.	1 7/8	Worthington	509						
Roberge & Shepherd.....	White's lane	Machinists	1 7/8	Empire	994						
Rubenstein Bros	537 Craig	Silver platers	1 7/8	Union	206						
Roberts G.....	597 Lagauchetière	Carpenter	1 7/8	Empire	1035						
Robillard & Co.....	282 St. André	Soda water &c.	2 7/8	Crown	714						
Royal Electric Co.....	St. Ignace	Electric Light Co.	1 7/8	Empire	918						
Robert J. & Son.....	97 Papineau road	Sawmills	1 7/8	Worthington	506						
Reinhardt G.....	8 Fortier	Dwelling house	1 7/8	Union	100						
Reinhardt & Sons	341 German	Brewers	1 7/8	Worthington	678						
Royal Electric Co.....	Queen	Electric Light Co.	2 7/8	Crown	1014						
Robertson J.....	172 Dalhousie	Saw & Lead W'ks	1 7/8	Empire	940						
"	"	"	1 7/8	"	1037						
Robertson T. & Co.....	70 Common	Lead Works	1 7/8	Union	260						
Robertson F.....	270 Wellington	Coal merchants	1 7/8	Empire	817						
Redemptorist Fathers	32 Basin	Home	1 7/8	Union	678						
Roberts J. W.....	336 St. James	Saddler	1 7/8	Worthington	580						
Rolland Bros	2520 Notre Dame	Furniture	3 7/8	Crown	934						
Robin & Saddler.....	Belting & Cc	"	1 7/8	Gem.	569						
Reid R.....	1234 St. Catherine	Marble cutters	1 7/8	Worthington	249						
Robinson J. T.....	1791 Notre Dame	Printers	1 7/8	Union	961						
"	"	"	1 7/8	Crown	961						

Dwelling house.
For cooling.

Specials.

Motor.

Gas engine.

SCHEDULE 11a.—METERS IN OPERATION. DECEMBER 31st 1890—Continued.

Name of consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By assessor.	All by meter.	Engines.	Elevator.	Specials.
St. V. de Paul Asylum.....	46 Visitation	Asylum	1"	Crown	217		X		X			Organ motor.
St. Bridget's Church.....	Maisonneuve	Church	1"	Gem	3							Organ motor.
St. Edwards Academy.....	105 "	Academy	2 1/2"	Worthington	511				X			Organ motor.
St. Peter's Church.....	107 Visitation	Church	2 1/2"	Gem	489							Organ motor.
Sorgins & Keiffer.....	188 Lafortune	Tanners	2 1/2"	Empire	919			X				Organ motor.
St. V. de Paul Church.....	796 St. Catherine	Church	2 1/2"	Gem	468							Brick making.
Sheppard	366 Fulham	Brick makers	1"	Worthington	492					X		"
		"	1"	Empire	927							"
		"	1"	Union	307							"
Smardon R.....	35 William	Manufacturers	1"	Crown	752				X			When water is out of the canal.
St. Edward's Refuge	109 Forfar	Asylum	1"	Worthington		Private.				X		"
Shearer J.....	St. Gabriel Locks	Sash factory	1"	Union		"						
Shearer J. & Brown.....	Richardson	"	1"	Worthington	697				X			
Savage & Son	312 William	Soap factory	2 1/2"	Gem	944						X	
Small E. A. & Co.....	288 St. James	Clothiers	1"	Empire	924							
South Am Trading Co.....	425 St. James	Traders	1"	Crown	976				X			Motor.
St. James Hotel	538 St. James	Hotel	1"	"	795							
Stroud D.....	2188 Notre Dame	Teas &c	1"	Empire	920				X			Organ motor.
St. Antoine Academy	856 Lagauchetière	Academy	1"	Gem		Private.						
St. Andrews Church	"	Church	1"	Empire	1000			X		X		
Slater G. T. & Sons	Juror	Boots & shoes	1"	Empire	567				X			
St. Bridget's Home.....	745 Lagauchetière	Asylum	1"	Worthington	139				X			
St. Patrick's Nun's school	79 Alexander	School	1"	Union	575			X				
Patrick's O. Asylum	774 Dorchester	Asylum	2 1/2"	Gem	458			X				Organ motor.
Sim's A. H. & Co	84 Latour	Shirt manuf	2 1/2"	Worthington	812	Private.			X			
St. Paul Church.....	846 Dorchester	Church	1"	Union	228				X			
St. James Church.....	University	Club	1"	Empire								
Star & Kinsella.....	70 Mansfield	Livery	2 1/2"	Worthington		Private.						
St. Georges Church.....	Stanley	Church	2 1/2"	Gem								

SCHEDULE 11a.—METERS IN OPERATION, DECEMBER 31st 1900.—Continued.

Name of consumers.	Streets.	Description of establishments.	Size of meters.	Kind of meters.	No. of meters.	Private.	Paid by meter.	By meter.	All by meter.	Engines.	Elevators.	Specials.
Walker J. R.	15 Common.	Merchant	3'	Gem	700		X				X	
Warren Scale Co.	456 St. Paul	Manufacturers	3'	Empire	887					X		
Wilson Estate	11 Place d'Armes.	Offices	4'	Gem	Private.							
White R.	202 Craig	Boots & shoes	1'	Worthington	518							
Witham J. & Co.	43 Maurice		1'	Empire	925							
Wutson J. C.	94 Grey Nnn	Paints & wall paper	1'	Worthington	620							
Witness Printing Co.	323 St. James	Printing Co.	1'	Union	286				X			
Webster House	334 "	Hotel	1'	Worthington	613							
Wells & Richardson & Co.	200 Mountain	Dye stuffs	1'	Crown	969							
Windor Hotel	Peel	Hotel	4'	Gem	777							
"	Dorchester		2'	Crown	938							
"	Stanley	Home	4'	"	600							
Women Exchange	2260 St. Catherine.	Manufacturers	2'	Empire	867							
Wilson J. C.	700 Craig	Furniture	2'	Gem	922							
Wilder H. A. & Co.	232 McGill	Confectioners	2'	Crown	429							
Walker D.	254 St. James	Dry goods	3'	Gem	964							
Walker Bros & Co.	84 St. Peter	Hardware	3'	"	771							
Wilson J. H.	1874 Notre Dame L.		3'		306							Small motor.



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No. 12—Schedule showing the Pipes &c.—Continued.

NAME OF STREETS.	Length in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass cocks.	Air cocks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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RECAPITULATION.—No. 12.—Schedule showing the Pipes, Hydrants, Valves, Services, &c. laid in the City of Montreal during the year 1890.

WARDS.	Length in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass cocks.	Air cocks.
	Length in feet of cast iron pipes.										No. of Valves.															
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.						
East.....	.....	.....	.....	.....	.....	.....	.....	12	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	187	16	2	14	
Center.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	285	23	2	21
West.....	.....	.....	.....	.....	.....	41117	313	61	41	1536	.....	.....	.....	.....	1	3	4	4	4	15	.....	6	52	2	.....	2
St. Ann.....	1219	279	256	6612	46	2135	111	176	13834	.....	4	.....	1	10	3	10	3	10	41	.....	.....	30	2752	126	7	119
St. Antoine.....	2188	812	6	2336	1326	4528	703	959	23858	.....	2	1	2	23	7	22	9	22	88	.....	.....	52	678	274	45	229
St. Lawrence	5	.....	.....	.....	.....	5500	2556	696	477	142	9376	1	.....	.....	10	7	6	1	2	27	.....	21	6560	328	9	319
St. Louis.....	.....	.....	.....	.....	.....	6689	546	748	656	299	8938	.....	.....	.....	14	2	7	4	9	36	.....	23	2471	162	2	160
St. James.....	.....	4350	96	3809	410	4391	323	69	12448	.....	.....	2	.....	12	6	11	4	7	43	.....	26	5497	293	1	292	
St. Mary.....	024	.....	.....	.....	.....	3306	1834	1517	1323	146	9130	.....	1	5	6	11	8	5	36	.....	14	6822	425	32	393	
St. Jean-Bapt	.....	.....	.....	.....	.....	840	.....	3167	2092	.....	6099	.....	.....	.....	.....	3	5	8	.....	.....	16	10878	650	.....	650	
Hochelaga.....	.....	.....	.....	.....	.....	836	176	826	514	144	2406	.....	.....	1	.....	1	3	1	6	.....	6	4493	283	33	249	
St. Gabriel...	2178	.....	.....	.....	198	.....	1068	135	125	3704	.....	3	.....	4	2	2	1	2	14	.....	5	5000	252	.....	252	
Totals...	59609	5441	358	40130	8011	18389	7407	2101	91451	.....	1	10	3	4	80	36	77	4262	315	.....	200	51785	1834	133	2700	

Schedule No 13.—Showing the Pipes, Hydrants and Valves laid down and the number of Houses supplied with water in the City of Montreal up to 1st January 1891.

WARDS	MAIN PIPES													LEAD P.P.S	VALVES												HYDRANTS		SERVICES	
																											Public	Private		
	30	24	20	16	12	10	8	6	4	3	1 1/2	TOTAL	30		24	20	16	12	10	8	6	4	3 1/2	TOTAL						
East					1400	6109	312	2394	7451	713	80	18459					1	8	4	12	33	2	60	41	1	810				
Center	1255				2544	3658	52	3503	6518	161	35	17726					5	8	4	10	29	7	65	30	4	633				
West	1490				3078	6710	1012	5589	6385	585		25533					1	6	19	8	12	36	18	100	46	828				
St. Ann	4219	279	256	654	12799	20129	3006	21308	53998	53		116947					24	29	13	64	93	3	234	180	16	3989				
St. Antoine	1310	4460	2006	1946	52627	13321	4528	44520	101096	523	367	926734					6	3	75	29	32	91	194	5	438	309	7	7468		
St. Lawrence	2140	2610			12009	7137	1878	23653	25203			74660					1	19	13	16	56	51	1	158	108		3706			
St. Louis	1645				10133	9408	829	22246	22298			76559						21	10	7	48	46		133	113		4136			
St. James	2488		4350		13372	1880	3834	29532	40940			96482				2		20	4	13	65	60		166	133	2	6403			
St. Mary	2585	7664			13703	10178	1674	49341	39516	60		124821				4		25	18	11	104	65	1	230	158	8	6619			
St. Jean Baptiste					11946	360	3241	26907	237			42691						16		3	40	2		61	115		3295			
Notre-Dame	3700				6803	7226	819	13668	15957			48203						8	5	1	26	25	1	66	59		1743			
St. Gabriel	2178				198	26	1186	7369	459			11416					3		4	2	4	10	11	34	60		778			
Total	10198	27606	5635	4052	140612	86142	22431	250020	330058	2095	482	879331				5	7	224	145	116	538	647	48	1745	1352	38	40408			
Rising main	16102	27709			1674			15	5484			45500					1	2						42			3			
Exhibition Gr'ds												5184												3						
Gr'd Trk. Ry Pl																									4					
St. Charles												9398														20				
Grand Total	26300	55315	6635	4052	142286	86142	22431	257772	337403	2095	482	939913				5	8	226	145	116	540	650	48	1790	1356	58	40411			

Month 1890.	At W. W. shop Lagauchetière street cor. St. Chas. Bor.	Central Fire Station	Fire Station No. 2 St. Gabriel St.	Fire Station No. 3 Wellington St.	Fire Station No. 4 Chaboulliez Sqr.	Fire Station No. 5 St. Catherine St.	Fire Station No. 6 Ontario St.	Fire Station No. 7 Dalhousie Sqr.	Fire Station No. 8 Craig St.	Fire Station No. 9 Centre St.	Fire Station No. 10 St. Catherine St.	Fire Station No. 11 Ontario St.	Fire Station No. 12 Seigneurs St.	Fire Station No. 13 Desery St.	Fire Station No. 14 St. Dominique St.	Fire Station No. 15 St. J. Bie Ward.	Fire Station No. 16 Island St. (St. Gabriel Ward.)	Average surface of water in McTavish Reservoir.
Height above datum	42.00	32.00	57.00	27.00	.....	97.00	66.00	70.50	43.00	26.00	130.00	70.00	36.40	44.00	.....	.....	.....	205.00
January	65.00	72.00	68.00	78.00	77.00	43.00	63.00	56.00	71.00	76.00	30.00	66.00	72.00	69.00	110.00	78.00	78.00	205.00
February	65.00	72.00	70.00	79.00	77.00	45.00	63.00	56.00	71.00	77.00	30.00	66.00	72.00	68.00	110.00	79.00	79.00	204.37
March	65.00	72.00	70.00	79.00	78.00	47.00	63.00	57.00	71.00	77.00	30.00	66.00	72.00	69.00	110.00	77.00	77.00	204.54
April	63.00	72.00	69.00	78.00	78.00	47.00	63.00	58.00	71.00	77.00	30.00	66.00	72.00	72.00	111.00	78.00	78.00	204.71
May	63.00	72.00	69.00	79.00	78.00	47.00	63.00	57.00	70.00	77.00	30.00	66.00	72.00	72.00	112.00	78.00	78.00	204.32
June	65.00	72.00	67.00	79.00	78.00	45.00	63.00	57.00	69.00	77.00	29.00	66.00	73.00	69.10	112.00	77.00	77.00	203.70
July	65.00	72.00	67.00	79.00	78.00	45.00	63.00	57.00	69.00	77.00	30.00	66.00	73.00	69.00	111.00	80.00	80.00	200.97
August	65.00	72.00	68.00	79.00	77.00	47.00	63.00	57.00	70.00	77.00	30.00	66.00	77.00	72.00	111.00	81.00	81.00	203.01
September	65.00	72.00	74.00	79.00	78.00	46.00	63.00	57.00	70.00	77.00	29.00	66.00	77.00	71.00	113.00	80.00	80.00	203.65
October	63.00	72.00	73.00	79.00	79.00	46.00	65.00	57.00	70.00	77.00	30.00	66.00	77.00	71.00	112.00	77.00	77.00	195.94
November	65.00	72.00	74.00	79.00	79.00	46.00	63.00	57.00	70.00	77.00	30.00	66.00	77.00	71.00	113.00	79.00	79.00	202.43
December	65.00	72.00	.....	79.00	79.00	45.00	65.00	58.00	70.00	77.00	29.00	66.00	77.00	71.00	113.00	70.00	70.00	204.36
Average 1890	65.00	72.00	69.00	78.00	78.00	45.00	63.00	57.00	70.00	77.00	30.00	66.00	74.00	70.00	111.00	78.00	78.00	203.03
" 1889	65.00	72.00	68.00	78.00	78.00	43.00	65.00	57.00	71.00	73.00	30.00	66.00	71.00	69.00	103.00	71.00	71.00	203.55

No. 18.—SCHEDULE showing the position of Public Fountains erected in the City of Montreal up to January 1891.

No.	LOCATION.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Drinking Troughs.	
1	Beaver Hall Square				1			
2	Bellevue Park	1			1			
3	Bleury and Dorchester			1				
4	Bonsecours Market							
5	Chabollez Square						1	
6	Cherrier Square				2			
7	Colborne at Flour Shed				1		1	
8	Court House Square	2	1	2				
9	Craig at Victoria Square			1				
10	Craig opposite Drill Hall				1		1	1
11	Custom House Square				1		1	1
12	Dorchester at Dominion Square				1		1	1
13	Dufferin Square				1		1	1
14	Fulford near Notre Dame				1		1	1
15	Guilbault and St. Lawrence				1		1	1
16	Jacques Cartier Square and St. Paul	1			1		1	5
17	Inspector at Hay Market						1	1
18	McTavish street, opposite Réservoir				1			1
19	McGill and Common			1			1	2
20	Mill street, at Waste Weir					1	1	2
21	Notre Dame near Ruisseau Migeon						1	1
22	Notre Dame and Suzanne				1		1	1
23	Ontario, opposite Reformatory grounds					1	1	2
24	Ontario and Champlain						1	2
25	Ottawa, corner Dalhousie						1	2
26	Papineau, north of Sherbrooke					1	1	2
27	Papineau Square		1			1	1	7
28	Park Avenue and St. Jean-Baptiste						1	2
29	Phillips Square				1			1
30	Phillips Square and St. Catherine						1	1
31	Place d'Armes	2	1					5
32	Prince and Common				1		1	2
33	Rachel and Champlain				1		1	1
34	Richmond Square				1		1	1
35	Seigneurs and William				1		1	1
36	Sherbrooke, near Drummond		1				1	2
37	Sherbrooke, corner Guy						1	1
38	St. Ann's Market					2		2
39	St. Antoine Market				1		1	2
40	St. Catherine and Western Park						1	2
41	St. Catherine and DeLorimier					1	1	2
42	St. Gabriel Market					1	1	2
43	St. Louis Square	1			2			9

No. 15.—SCHEDULE.—Continued.

No.	LOCATION.	Cast Iron Basins, Stone and Cement Basins.	Stone Fountains.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Cattle Drinking Troughs	Number of Jets.
44	St. Patrick and Richmond .....	.....	.....	1	.....	1	1
45	St. Patrick and Napoléon .....	.....	.....	1	.....	1	1
46	St. Patrick and Wellington .....	.....	.....	1	.....	1	3
47	St. Thomas and Ottawa .....	.....	.....	1	.....	1	1
48	Victoria Square, south of Craig .....	.....	1	2	.....	.....	6
49	Victoria Square, north of Craig	3	.....	.....	.....	.....	4
50	Viger Square, Basin No. 1 .....	.....	1	.....	.....	.....	1
51	Viger Square, Basin No. 2	3	.....	.....	.....	.....	9
52	Viger Square .....	.....	.....	1	.....	.....	2
53	Viger Market .....	.....	.....	.....	2	6	6
54	Wellington and Centre	1	.....	.....	.....	.....	1
55	Wellington and Magdalen .....	.....	.....	1	.....	1	1
56	St. Patrick's Square	2	.....	.....	.....	.....	2
57	Dalhousie Square	2	.....	.....	.....	.....	1

No.	LOCATION	Road Watering Nozles.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Cattle drinking Troughs	Number of Jets.
Distributed through Mountain Park.						
1	High Level Réservoir .....	.....	1	.....	.....	1
2	Foot of elevator .....	.....	1	.....	1	1
3	Alongside Molson's fence .....	.....	.....	1	.....	1
4	Above Golf Club House .....	.....	.....	1	.....	1
5	Park Road, north of elevator	3	10	.....	.....	3
6	Park Road, running west side Hall property .....	.....	.....	1	.....	1
7	Park Avenue, opposite St. Jean-Baptiste street	1	.....	.....	1	2

No. 15.—SCHEDULE.—Continued.

No.	LOCATION Distributed along the Wharves.	Road Watering Nozzles.	Cast Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals.	Number of Jets.
1	Wind-Mill Point.....		6	1	1	1	3
2	Allan's Wharf.....		1			1	2
3	Allan's Sheds.....				1		2
4	Custom House (opposite)					1	2
5	King's Basin		1				1
6	Dominion Line				1	1	3
7	Jacques Cartier Square (foot of)		1				1
8	St. Gabriel Street (foot of)	1					1
9	St. Helen's Island Ferry						1
10	Beaver Line			1	1	1	3
11	Donaldson Line, foot of Grant street					1	1
12	Commissioners, east of Barrack	1					1
13	Longueuil Ferry					1	2
14	Marlborough street (foot of).....					1	2
15	Desery Street (foot of)					1	2
16	Gale Street (west of)					1	2

ADMINISTRATION.

LE No. 16.—Detailed statement of expenditure for the year 1890.

AQUEDUCT.	\$	cts	\$	cts
fences, gates and approaches.	242	67		
bridges and painting.....	910	73		
ditches and repairing banks.	195	57		
seeds.....	93	60		
and cleaning, little "Rivière e".....	150	00		
salary.....	600	00		
".....	385	63		
horse keep.....	200	00		
vice.....	68	58		
service.....	26	00		
dwellings.....	306	97	3679	75

WHEEL HOUSE.

y, chief engineer, $\frac{1}{2}$ pay.....	850	00		
Ass't ".....	900	00		
" ".....	900	00		
court, Oilers.....	1000	00		
machinery.....	51	22		
buildings.....	453	89		
dwellings.....	271	95		
ound buildings.....	60	49		
Breast Wheel.....	805	00		
leak under foundations.....	3663	47		
.....	53	21		
oil, tallow, &c.....	816	47	9825	70

ENGINE HOUSE.

ler, st'm pipe for new b'ler &c.	361	60		
achinery and painting engine.	388	01		
engine and boiler houses....	427	73		
.....	6394	80		
ineer, $\frac{1}{2}$ pay.....	850	00		
".....	1050	00		
clerk.....	657	33		
eam.....	7510	51		
and.....	50	00		
service.....	25	00		
.....	326	81		
oil, tallow &c.....	619	67	18661	46

Carried..... 32166 91

	\$	cts.	\$	cts.
Brought forward.....			32166	91
MACHINE SHOP.				
Repairing chimney.....	30	00		
Sundries.....	27	22	57	22
TAIL RACE.				
Repairs to fences.....			16	16
PIPE TRACK.				
Repairing valves.....	6	25		
" " chambers.....	414	69		
Taking down and rebuilding wall on Atwater Av. between Dorchester and St. Antoine Streets.....	5806	37		
Repairing and Painting " Rivière St. Pierre Bridge".....	43	99		
Levelling Atwater Avenue.....	117	92	6389	22
RESERVOIRS.				
Guardian's salary $\frac{1}{3}$ of his salary.....	400	00		
McTavish, repairing and cleaning	3176	80		
Shovelling snow.....	8	64		
Fuel and light.....	80	89		
Repairs to dwellings.....	18	79		
Painting.....	77	61		
High level, repairing overflow and drain pipes	736	72		
High level, cleaning.....	68	80		
" watching.....	297	03	4865	28
METER DEPARTMENT.				
2 Meter inspectors.....	1600	00		
Testing, placing and repairing meters..	2682	75		
New meters.....	6576	43		
Repairs to buildings.....	9	82	10869	00
Carried.....			54363	79

	\$	cts.	\$	cts.
Brought forward.....			54363	79

ENGINE HOUSE HIGH LEVEL.

Engineer, & pay.....	500	00		
One stoker and ass't engineer.....	1365	52		
Fuel for engine.....	2265	80		
Oil, tallow, packing &c.....	323	39		
Repairs to buildings.....	5	65		
" " machinery.....	354	58		
Ash pit.....	345	07		
Telephone service..	44	50		
Light.....	24	09		
Sundries.....	115	10	5343	70

WORK SHOP ON LAGAUCHETIÈRE ST.

Wages: foreman, clerks, turncocks, mechanics, laborers, carters, night watchman.....	7827	14		
Iron, spikes, nails, tin, lead &c.....	70	05		
Rent of foremans' house.	200	00		
Telephone service.....	102	32		
Fuel and light.....	745	93		
Repairs to buildings.....	384	70		
New water motor.....	195	80		
Shops in new wards.....	699	03		
Sundries.....	115	14	10340	11

DISTRIBUTION PIPES.

Repairing mains, services, valves: wages.....	15452	41		
Thawing pipes and carting water.....	925	59		
Inspecting service pipes inside houses.	3107	50		
Dress for 5 inspectors.....	255	25		
Repairing footpaths and service boxes: wages.....	1367	62		
Materials: iron, castings, lead, &c.....	547	19		
" wood, planks, nails &c.....	321	24		
" rope, drain pipe &c.....	141	29		
Two Well's Lights and 8 gasoline furnaces.....	200	00		
An express waggon.....	115	00	22433	09
Carried.....			92480	69

124

\$ cts \$

Brought forward.....

92480 62

PUBLIC FOUNTAINS.

Repairing: wages, including alterations to St-Louis Square Fountains.....	1396	52	
Materials.....	32	48	
Painting.....	172	52	
New troughs and drinking fountains..	548	74	
Papineau Square Basin.....	262	88	2413 14

HYDRANTS

Inspecting: wages.....	6308	28	
Repairing " and materials.....	2641	10	
Thawing: horses and laborers.....	767	67	
Rent of tap house in St. Jean Bte. ward	56	00	
Coal for " 	60	00	
" " boilers.....	56	02	9889 07

MISCELLANEOUS.

Contingencies for office: drawing papers, inks, colours, instruments, &c.....	814	13	
Postage stamps, carters, sundries.....	270	00	
Telephone sup'ts' office.....	51	25	
Horsekeep sup't.....	400	00	
" foreman	350	00	
Damages.....	783	20	
School taxes and assessments.....	518	00	3187 18

STAFF.

Superintendent.....	3500	00	
Ass't " 	2000	00	
Accountant.....	1200	00	
Draughtsman.....	1000	00	
Clerk and secretary.....	900	00	
" " chief inspector.....	900	00	9500 00
Carried.....			117470 08

\$ cts \$ cts

Brought forward... 117470 08

RENEWING TAIL RACE

BRIDGE..... 3241 56

ANALYSING WATER..... 474 70 3716 26 121186 31

LOANS.

PIPE LAYING.

Wages.....146489 86
 Tin and lead.....15619 75
 Lead pipes... 5741 10
 Brass works, copper.... 7627 27
 Timber..... 4058 17
 Bricks, sand, clay..... 3729 01
 Drain pipes..... 299 11
 Special castings (pat-
 terns \$385.75).....47889 02
 Cement..... 562 68
 Iron and steel..... 2937 19
 Tools..... 2777 56
 Packing..... 434 37
 Wrought iron pipes..... 946 29
 Cast iron pipes.....191508 33
 Valve stones..... 17 50
 Sundries..... 3563 33
 Rock excavation in St.
 J. Baptiste ward..... 1266 50
 Coal..... 644 74
 Carting pipes..... 5457 80
 Testing and inspecting
 pipes..... 2551 79
 Culvert under Grd. Trk.
 By. Track..... 3957 82 448079 19

SPECIAL.

New boiler for High
 Level engine.....

62 00 448141 19 \$569327 53

SCHEDULE No. 17.—Inventory of stock on hand, January 1891.

SIZE.	30"	24"	20"	16"	12"	10"	8"	6"	4"	4½"	2"	1"
Cast iron pipes (new).....	492	838	3240	1332	4224	900	9424	972	549	396	396	4

DESCRIPTION.	30"	24"	20"	16"	12"	10"	8"	6"	4"
Cast iron pipes (old).....									
Stop-valves	2	2			9		5	1	
Slip sockets	11	40	10	32	8	23	52	48	7
Cast iron caps				3	19	14	48	8	
Cast iron plugs				3	34	30	12	150	106
Cast iron double bends.....						6	5	17	2
Cast iron elbows.....					17	33	4	14	2
Cast iron sweeps.....	1	10	1	7	8	4	4	6	

CROSSES.

30x20	30x12	30x6	30x4	24x24	24x16	24x12	24x8	20x6	16x12	16x6	12x12	12x8
1	6	1	1	4	2	4	3	2	1	1	13	1

CROSSES.

12x6	10x8	10x6	10x4	8x8	8x6	8x4	6x6	6x4	4x4	4x3
2	5	2	4	6	6	2	12	1	6	4

TEES.

30x12	30x6	30x4	24x12	24x8	24x6	24x4	20x4	12x12	12x8	12x6	12x4	10x10
1	1	1	2	8	5	8	1	1	1	2	1	1

TEES.

10x8	10x6	10x4	8x8	8x6	6x6	6x4	4x4
3	3	2	1	2	7	4	2

TAPERS.

30x24	24x16	20x16	16x12	12x10	12x8	12x6	10x8	10x6	8x6	8x4	6x4	4x3
6	1	1	1	5	38	12	13	4	12	40	5	41

BREECHES PIPES.

30x30	30x24	24x24	12x12	12x10	10x10	10x6
3	1	1	3	2	4	3

SCHEDULE No. 17.—*Continued.*

New hydrants (5 noz.).....	12	Hydrants already used.....	117
Cast iron fender posts.....	51	Street water. nozzle (brass). 555	
Hydrant covers assorted....	124	“ “ “ (iron)... 102	
Pieces for lengthening hydrant.....	46	Hydrant nozzles.....	10
Assorted valve covers.....	71	Assorted spindles.....	71
		Rods for stop-cocks assorted	40
<hr/>			
1½" cocks for iron pipe.....	14	Assorted covers for boxes...	638
1" pneumatic valves... ..	2	Brass y's ½".....	81
½" “ “.....	27	2" iron pipe (in feet).....	50
½" “ “.....	150	1½" “ “.....	447
2 way pneumatic valves.....	28	1" “ “.....	300
3 “ “ “.....	40	1" lead pipe (in lbs.) 67	
4 “ “ “.....	10	rolls.....	11,862
1" coupling cocks.....	10	½" lead pipe 24 rolls.....	3,600
½" “ “.....	2	½" “ 221 “.....	53,550
½" “ “.....	6	Lead (pig in lbs.).....	2,768
½" crosses.....	9	Block tin (in lbs.).....	396
1" x ½" T's.....	122	⅜" copper tubing (in lbs.)...1,714	
1" nozzles.....	1	Valve stones (large).....	4
½" “.....	114	“ “ (small).....	10
½" “.....	18	4" iron boxes.....	1

Water Works Shop, Feb. 19th, 1891.

SCHEDULE 17 (Continued).—Inventory of patterns in stock, January, 1891.

DESCRIPTION.	30"	24"	20"	18"	16"	12"	10"	8"	6"	4"
Stop valves	1	1	.....	1	1	2	2	2	2	2
Double bends .....	.....	.....	.....	.....	.....	.....	2	2	1	1
Single " .....	.....	.....	.....	.....	1	2	2	1	1	1
Plugs .....	.....	.....	.....	.....	.....	1	1	1	1	1
Bonnets .....	.....	.....	.....	.....	.....	1	1	1	1	1
Sockets	1	4	1	1	1	3	3	2	2	1
Sweeps .....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Radial sockets .....	.....	.....	.....	.....	.....	1	.....	1	.....	.....

CROSSES.

12x12	20x12	20x8	12x12	12x10	12x8	12x6	12x4	10x10	10x8	19x6	10x4	8x
1	1	1	2	1	2	1	1	1	1	1	1	2

CROSSES.

	8x6	6x6	6x4	8x4	4x3	3x3	4x4
	1	2	1	1	1	1	1

TEES.

BREECHES PIPES.

16x12	12x10	12x8	12x6	10x6	8x8	8x6	30x30	12x12	12x6	10x10	6x6
1	2	1	1	1	1	1	1	1	1	1	1

TAPERS.

24x16	20x16	16x12	12x10	12x8	12x6	10x8	10x6	8x6	8x4	6x4	4x3
1	1	1	1	3	1	1	1	1	1	1	1

HYDRANTS.

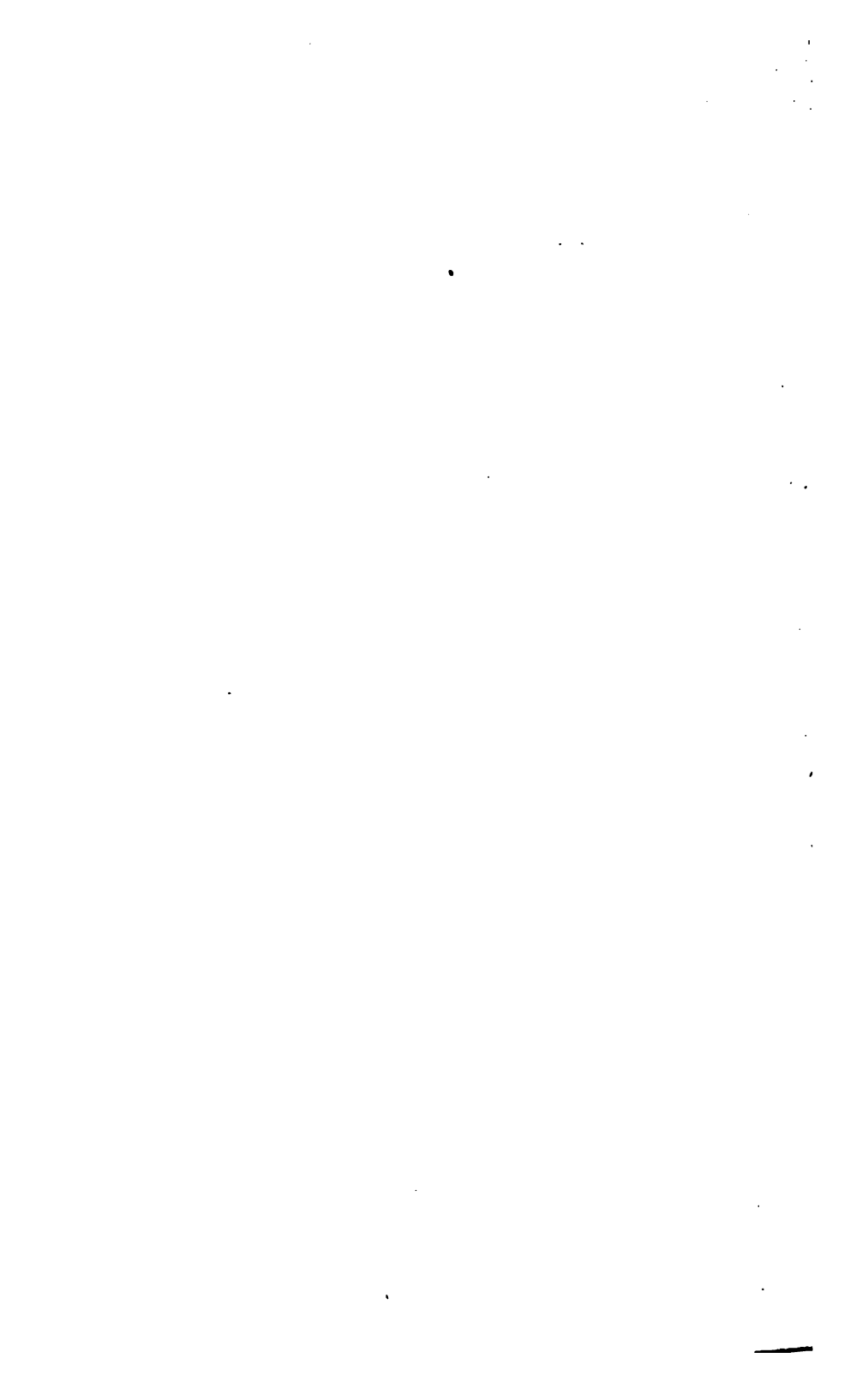
	3 noz.	5 noz.
	2	2

- 2 Footpath service box plates.
- 1 Square, valve core pattern.
- 2 1" Service pattern and core boxes.
- 1 4" Hydrant seat and core box.
- 1 3" " " " "
- 1 Grate for small furnace.
- 2 3/4 Service boxes and core boxes.
- 3 Hammer patterns.
- 1 Casing, for old hydrant.
- 2 Service boxes and core boxes.
- 1 24" Double Socket with bolts.
- 2 Valve frames and covers complete.
- 1 Large furnace grate.

- 1 12" Blind flange.
- 1 20" " "
- 1 30" pipe 3f. long for connecting valve
- 1 4" pipe 2 ft. long and core box.
- 1 8" pipe 2 ft. long socket & core box.
- 3 pieces pipe with flanger for lengthening hydrants

1	1	1
24"	12"	6"
- 1 Large lead pot pattern.
- 1 Small " " "
- 1 Plumber's lead pot pattern.
- 3 Taper patterns

1	1	1
1 1/2 x 4	2 x 4	2 1/2 x 4



MONTREAL WATER WORKS.

No. 18.—Schedule—Approximative cost of laying Main Pipes in the City in 1890.

NAME OF STREETS.	24"	20"	16"	12"	10"	8"	6"	4"	Total.	Valves.	Hydrants.	Wages.		Materials.		Total.	
												\$	Cts.	\$	Cts.	\$	Cts.
<i>East Ward.</i>																	
St. Thérèse.....											1	35	92	74	78	110	70
											1	35	92	74	78	110	70
<i>West Ward.</i>																	
St. Helen					344				344	1		404	18	582	68	986	86
McGill											1	28	20	49	42	77	62
Commissioners											1	26	48	58	14	79	62
St. Peter					773	293			1066	14	2	1982	70	2486	79	4469	49
Fortification										1	1	77	53	163	70	241	23
					1117	293			1410	16	6	2519	09	3335	73	5854	82
<i>St. Ann's Ward.</i>																	
Chatham						156			151	1	1	194	66	297	48	492	14
Canning				350					350	1	1	459	86	877	60	1337	46
Basin						330			330	2	2	78	71	596	89	675	60
McCord				1933					1933	8	4	5600	54	5145	19	10745	73
Centre	2139	279	192						2610	4	2	5952	49	13560	91	19513	40
Montmorenci	2068								2068	5	1	9238	32	13834	02	23132	34
St. Patrick										9	3	177	92	568	14	746	06
Condé				300					300	1		276	31	797	99	1074	30

St. Louis Ward.

Market	5500	2530	126	432	135	8723	27	21	5896	14	19892	29	25788	43
Parizeau .....	.....	223	.....	.....	.....	225	1	.....	158	90	302	00	480	90
Sherbrooke .....	.....	.....	.....	.....	189	189	1	.....	32	98	118	01	151	02
Ontario .....	.....	1550	.....	.....	.....	1550	1	6	1900	37	3841	35	5781	72
Mignonne .....	.....	1272	.....	.....	.....	1272	10	5	-1841	99	4462	91	6304	90
Laval Avenue .....	.....	.....	.....	.....	.....	.....	1	.....	8	24	49	42	57	66
Albina .....	.....	.....	.....	.....	45	45	1	.....	.....	.....	47	90	47	90
St. Constant .....	.....	.....	.....	72	.....	72	1	.....	52	14	125	10	177	24
St. Denis .....	.....	.....	.....	.....	.....	.....	1	.....	15	95	19	28	35	23
St. Dominique .....	.....	3864	.....	.....	.....	3864	18	10	4643	58	9906	58	14550	16
.....	.....	69	.....	.....	.....	69	2	1	120	68	314	40	435	08
.....	6686	294	.....	72	224	7286	37	22	8774	83	19186	98	27981	81

St. James Ward

Dubord .....	.....	.....	.....	.....	.....	.....	.....	.....	22	77	49	38	72	15
Roy .....	.....	575	.....	.....	.....	575	.....	1	313	26	1205	53	1518	79
Water .....	.....	.....	.....	.....	.....	.....	1	.....	16	25	29	20	45	45
Sherbrooke .....	.....	180	.....	.....	.....	180	3	1	260	53	580	62	841	15
Perthuis .....	.....	338	.....	.....	.....	338	2	1	414	54	786	81	1201	35
Lagau thetière .....	.....	.....	.....	.....	.....	.....	1	.....	124	62	22	90	147	52
St. Hubert .....	.....	262	2287	.....	.....	2549	6	7	2400	71	4152	14	6552	85
Craig .....	.....	2450	.....	.....	.....	.....	10	6	47	74	11	19	58	93
Ontario .....	.....	.....	.....	.....	.....	2450	.....	.....	3402	38	7123	09	10525	47
Carried over	3467	338	2287	.....	.....	6092	23	16	7002	80	13900	86	20963	66

St-Jean-Baptiste Ward.

[illegible]

Hochelaga Wurd.

[illegible]

St. Gabriel Ward.

Knox Avenue .....	.....	.....	.....	99	63 81	69 68	133 49
Mullin .....	.....	.....	.....	101	107 72	121 14	228 86
Carried over .....	.....	.....	.....	99	171 53	190 82	362 35

* No excavation.

MONTREAL WATER WORKS.

No. 18.—Schedule.—Approximative cost of laying Main Pipes in the City in 1890.—Continued.

NAME OF STREETS.	24"	20"	16"	12"	10"	8"	6"	4"	Total.	Valves.	Hydrants.	Wages.		Materials.		Total.	
												\$	Cts.	\$	Cts.	\$	Cts.
<i>St. Gabriel Ward.—Continued.</i>																	
Brought forward.....						101		99	200	1		171	53	190	82	352	35
Alwater (Drain pipe) *.....							108		108			551	13	109	06	660	19
Favard.....						232			232			252	99	274	10	527	09
Charron.....						308			308			232	68	364	66	594	34
Napoléon Road.....						12			12	1	1	60	36	147	38	207	74
Ceptre.....	2178			198					2376	11	3	9521	14	14535	73	24056	87
St. Patrick.....						369					1			77	50	77	50
Albert.....									369			222	70	418	70	641	40
	2178			198		1022	108	99	3603	14	5	11012	53	16114	95	27127	48

* Drain pipe.

No. 18.—Schedule.— Approximative Cost of Laying Main Pipes in the City in 1890.—Continued.

WARDS.	24"	20"	16"	12"	10"	8"	6"	4"	Total.	Valves.	Hydrants.	Wages.		Materials.		Total.
												\$	Cts.	\$	Cts.	
East.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	35	92	74	75	110 70
West.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	2519	09	3335	72	5854 82
St. Ann.....	4207	279	192	6612	.....	1616	.....	.....	12906	41	30	31206	42	47404	46	78610 88
St. Antoine.....	2188	812	.....	12239	1295	3749	1543	459	22285	88	51	26720	21	61066	46	87786 67
St. Lawrence.....	.....	.....	.....	5500	2330	126	432	135	8723	27	21	5896	14	19892	29	25788 43
St. Louis.....	.....	.....	.....	6686	294	.....	72	234	7286	37	22	8774	83	19186	98	27961 81
St. James.....	.....	.....	.....	3683	338	2287	.....	.....	10754	43	26	12635	66	36768	98	49404 64
St. Mary.....	1024	.....	.....	3264	1811	707	1137	.....	7943	36	14	9176	05	22226	90	31402 95
St. Jean-Baptiste.....	.....	.....	.....	840	.....	3119	1990	.....	5949	8	16	2669	19	6909	21	9578 40
Hochelaga.....	.....	.....	.....	836	176	762	472	144	2390	6	6	1067	07	4158	70	5225 77
St. Gabriel.....	2178	.....	.....	198	.....	102	108	99	3605	14	5	11012	53	16114	95	27127 48
	9597	5441	288	39858	7561	13681	5754	1071	83251	316	198	111713	11	237139	44	348852 55

MONTREAL WATER WORKS.

No. 19.—Schedule.—Cost of laying Service Pipes in 1890.

NAME OF STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
EAST WARD.				
		\$ Cts.	\$ Cts.	\$ Cts.
Champ-de-Mars.....	1	25 91	3 87	29 78
Commissioners.....	1	6 82	4 76	11 58
Barrack.....	3	16 12	7 71	23 83
St-Louis.....	4	31 31	14 34	45 65
St-Vincent.....	1	10 30	8 91	19 21
St-Paul.....	6	17 10	12 18	29 28
		107 56	51 77	159 33
CENTRE WARD.				
Fortification.....	10	51 65	26 05	77 70
Le Royer.....	1	4 18	11 11	15 29
Craig.....	10	24 90	23 83	52 73
Common.....	1	5 63	5 02	10 65
St-James.....	1	78	7 92	8 70
	23	87 14	77 93	165 07
WEST WARD.				
St-Helen.....	1	6 37	4 52	10 89
Notre-Dame.....	1	50 58	9 34	59 92
	2	56 95	13 86	70 81
ST-ANN'S WARD.				
St-Francis.....	4	45 24	12 40	57 64
Smith.....	1	18 86	5 57	24 43
St-Etienne.....	1	10 97	6 82	17 79
Canning.....	2	12 13	5 82	17 95
St-Martin.....	1	9 73	3 78	13 51
McCord.....	1	20 03	3 60	23 63
Center.....	2	40 19	1 06	51 25
Murray.....	6	67 04	25 22	92 26
St-Patrick.....	1	78	5 29	6 07
Shearer.....	2	28 27	7 86	36 13
Manufacturers.....	5	3 90	12 15	16 05
Dalhousie.....	1	21 69	12 98	34 67
Condé.....	1	14 47	4 95	19 42
College.....	2	17 91	18 71	36 62
St-Maurice.....	4	24 31	12 98	37 29
Carried forward.....	34	335 52	149 19	484 71

chedule.—COST OF LAYING SERVICE PIPES.—Continued.

F STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
WARD.—Continued.		\$ Cts.	\$ Cts.	\$ C
Brought forward.	34	335 52	149 19	484 71
.....	3	14 80	6 49	21
.....	1	14 44	5 58	20
.....	1	13 35	8 19	21
.....	4	43 66	16 39	60
.....	4	31 80	20 79	52 59
.....	4	34 59	12 55	47 14
.....	1	14 06	5 85	19 91
.....	12	88 17	63 63	151 80
.....	2	14 41	9 29	23 70
.....	1	13 77	7 09	20 86
.....	1	24 68	6 10	30 78
.....	6	28 66	27 98	56 64
.....	23	139 73	79 49	219 22
.....	28	106 19	79 64	185 83
.....	1	19 26	10 03	29 29
	126	937 09	508 28	1445 37
ONE WARD				
.....	6	32 69	19 54	52 23
.....	5	18 14	13 01	31 15
.....	1	2 53	7 60	10 13
.....	21	74 26	60 57	134 83
.....	1	10 50	7 38	17 88
.....	24	103 40	136 69	240 09
.....	5	26 18	15 35	41 53
.....	1	11 13	3 60	14 73
.....	3	16 53	8 52	25 05
.....	1	15 97	5 30	21 27
.....	4	43 07	16 81	59 88
.....	6	14 71	8 52	23 23
.....	1	8 38	3 42	11 80
.....	1	16 82	6 12	22 94
.....	7	91 44	18 36	109 80
.....	3	43 70	18 17	61 87
.....	1	11 73	8 54	20 27
.....	2	57 44	10 16	67 60
.....	2	25 36	12 82	38 18
.....	3	18 14	7 41	25 55
.....	12	51 52	26 07	77 59
.....	5	50 93	32 80	83 73
.....	6	79 32	36 20	115 52
.....	1	4 53	8 14	12 67
ied	122	828 42	491 10	1319 51

No. 19.—Schedule.—COST OF LAYING SERVICE PIPES.—*Continued.*

NAME OF STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
		\$ Cts.	\$ Cts.	\$ Cts.
ST-ANTOINE WARD.— <i>Cont'd.</i>				
Brought forward.....	122	828 42	491 10	1319 52
MacKay	1	8 78	2 97	11 75
Latour	1	12 88	6 64	19 52
Essex Avenue	4	11 39	9 76	21 15
Aylmer.....	2	20 62	8 49	29 11
Richmond	3	55 26	10 20	65 46
St. Antoine	9	55 44	32 67	88 11
Aqueduct.....	4	42 35	29 71	72 06
Closse.....	12	56 12	43 68	99 80
Richmond Square.....	1	10 78	4 68	15 46
Notre-Dame	2	26 35	9 65	36 46
Durocher	2	17 99	8 54	26 53
Dorchester.....	13	221 53	54 91	276 44
Guy.....	4	79 43	23 84	103 27
Versailles.....	11	51 74	38 01	89 75
Argyle Avenue.....	2	28 57	9 35	37 92
University.....	2	9 46	4 08	13 54
McGill College Avenue.....	1	9 87	11 74	21 61
Stanley.....	9	217 90	61 15	279 05
McGregor.....	1	19 77	4 90	24 67
Canning.....	1	4 83	12 98	17 81
St-Mark.....	1	10 49	6 12	16 61
Cathcart	1	4 46	5 29	9 75
Mountain.....	7	52 27	40 96	93 23
St-James.....	15	87 05	185 38	272 43
Mansfield	11	76 99	55 54	132 53
Peel	5	63 47	40 13	103 60
Drummond	3	46 54	29 09	75 63
Chatham.....	5	29 83	14 08	43 91
Windsor.....	5	54 25	32 05	86 30
Ste. Catherine	4	47 48	17 00	64 48
Quesnel	4	18 98	13 99	32 97
Seigneurs.....	6	31 66	13 86	45 52
	274	2312 95	1332 54	3645 49

Schedule.—COST OF LAYING SERVICE PIPES.—*Continued.*

STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
NCE WARD.		\$ Cts.	\$ Cts.	\$ Cts.
.....	1	4 68	4 32	9 00
.....	15	24 61	33 15	57 76
.....	6	49 62	16 69	66 31
.....	8	86 74	33 08	119 82
.....	61	310 33	254 82	565 15
.....	2	23 70	4 80	28 50
.....	10	48 77	46 12	94 89
.....	12	103 38	42 27	145 65
.....	21	159 73	74 27	233 73
.....	15	186 35	79 41	265 76
.....	1	14 48	6 12	20 60
.....	8	43 52	26 15	69 67
.....	4	20 22	17 32	37 54
.....	1	11 85	4 78	16 63
.....	10	79 39	38 19	117 58
.....	7	51 75	21 50	73 25
.....	1	11 99	6 52	18 51
.....	10	61 72	48 05	109 77
.....	1	15 05	10 17	25 22
.....	1	20 03	5 26	25 29
.....	2	8 26	6 74	15 00
.....	3	9 39	7 71	17 10
.....	1	26 25	3 69	29 94
.....	4	19 13	10 51	29 64
.....	3	49 17	15 29	64 46
.....	6	37 57	22 11	59 68
.....	1	9 91	8 71	18 62
romée.....	21	101 68	75 95	177 63
.....	90	464 12	323 98	788 10
.....	2	27 92	7 28	35 20
	328	2081 31	1254 69	3336 00

COST OF LAYING SERVICE PIPES—Continued

	Per 100 Feet	WAGES.	MATERIALS.	TOTAL.
		\$ Cts.	\$ Cts.	\$ Cts.
100	82 13	24 12	66 23	
100	2 50	3 69	5 22	
100	7 80	4 32	12 12	
100	14 89	8 25	23 21	
100	85 51	25 35	110 86	
100	4 31	5 61	9 92	
100	11 13	5 61	14 74	
100	68 22	20 84	79 07	
100	21 74	14 90	36 64	
100	45 87	27 19	73 06	
100	9 86	5 84	14 90	
100	76 57	40 38	116 95	
100	12 68	14 29	26 97	
100	28 25	11 63	39 88	
100	68 07	20 57	88 64	
100	9 98	5 29	15 27	
100	104 63	101 73	206 36	
100	740 07	76 63	816 70	
100	40 07	54 29	114 46	
100	76 57	39 18	115 75	
100	65 12	30 51	95 63	
100	52 25	18 25	70 50	
77	1567 54	566 57	2154 11	
100	22 06	45 23	105 29	
100	11 16	45 31	116 47	
100	21 44	15 65	37 09	
100	9 24	14 74	23 98	
100	45 97	54 70	204 67	
100	24 70	24 28	48 98	
100	49 51	34 25	83 76	
100	41 63	22 09	63 72	
100	4 56	5 88	10 44	
100	155 59	91 21	246 80	
100	315 40	113 56	428 96	
100	72 59	24 73	97 32	
100	64 36	44 45	108 81	
100	21 45	16 73	38 18	
100	70 64	47 38	118 02	
100	32 27	29 05	61 32	
100	35 20	34 78	69 98	
100	49 99	26 01	76 00	
100	101 32	42 18	143 50	
100	1353 08	730 21	2083 29	

dule.—COST OF LAYING SERVICE PIPES.—Continued.

STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
		\$ Cts.	\$ Cts.	\$ Cts.
<i>Continued</i>				
Forward.....	187	1353 08	730 21	2083 29
.....	11	48 78	38 39	87 17
.....	21	93 11	59 41	152 52
.....	41	245 71	127 52	373 23
.....	5	75 52	21 94	97 46
.....	13	46 75	34 81	81 56
.....	15	107 73	49 47	157 20
	293	1970 68	1061 75	3032 43
WARD.				
.....	8	30 07	28 95	59 02
.....	10	7 80	28 18	35 98
.....	2	9 73	5 48	15 21
.....	2	10 15	9 21	19 36
.....	4	29 49	9 45	38 94
.....	2	14 92	6 50	21 42
.....	5	15 07	12 29	27 36
.....	12	26 91	28 71	55 62
.....	8	20 62	22 34	42 96
.....	10	113 99	47 19	161 18
.....	7	40 61	16 84	57 45
.....	11	78 34	41 19	119 53
.....	16	33 85	35 68	69 23
.....	38	135 60	117 05	242 65
.....	44	158 12	167 26	325 38
.....	6	25 41	17 58	42 99
.....	3	18 72	7 30	26 02
.....	6	33 88	26 31	60 19
.....	24	69 74	63 54	133 28
.....	48	237 68	179 34	417 02
.....	14	51 48	55 08	106 55
.....	14	87 22	47 24	134 46
.....	6	52 66	31 03	83 69
.....	5	20 03	20 45	40 48
.....	3	44 10	24 23	68 33
.....	34	121 72	113 62	235 34
.....	25	95 72	315 46	411 18
.....	9	34 63	29 10	63 73
.....	3	12 68	6 76	19 44
.....	4	19 91	14 53	34 44
.....	16	91 35	40 83	132 18
.....	9	40 91	30 65	71 56
.....	5	50 67	15 21	65 88
.....	8	54 61	29 34	83 95
.....	4	31 18	17 74	48 92
	425	1909 27	1661 66	3570 93

No. 19.—Schedule.—COST OF LAYING SERVICE PIPES.—*Continued.*

NAME OF STREETS.	No. OF SER- VICES.	WAGES.	MATERIALS.	TOTAL.
ST. JEAN-BAPTISTE WARD.		\$ Cts.	\$ Cts.	\$ Cts.
Seaton	7	65 25	26 35	91 60
Amherst	6	72 99	18 75	91 74
Pantaleon	201	1279 31	650 27	1929 58
Montana	31	97 91	102 49	200 40
Maisonneuve	8	43 92	30 02	74 00
Plessis	8	19 65	24 43	44 08
Papineau Road	32	203 75	109 10	312 85
Dufferin	19	114 62	72 77	187 39
Champlain	6	28 98	15 61	44 59
St. Jean-Baptiste	31	102 39	109 94	212 33
St. Dominique	1	89 02	6 65	95 67
Mont-Royal Avenue	10	26 08	22 27	48 35
Berri	36	126 71	116 34	243 05
Marie Anna	2	1 56	7 01	8 57
St. Hypolite	5	126 15	17 06	143 21
Maple	32	178 64	115 92	294 56
Sanguinet	12	231 46	40 57	272 03
St. Urbain	5	85 95	18 36	104 31
St. Lawrence	5	18 19	13 29	31 48
St. Denis	20	175 69	71 96	247 65
Laval Avenue	49	277 82	156 29	434 11
Drolet	41	148 86	119 89	268 75
Cadioux	8	192 19	23 30	215 49
Rachel	18	81 19	60 66	141 85
Rivard	57	138 87	179 86	318 73
	650	3927 15	2129 22	6056 37
HOCHELAGA WARD.				
Davidson	50	166 86	146 56	313 42
Cuvillier		61 82		61 82
Darling	24	80 75	69 75	150 50
Hudon	1	78	9 73	10 51
Ontario	12	66 67	46 44	113 11
Notre-Dame	34	165 70	100 73	266 43
Déséry	8	34 04	29 02	63 06
Frontenac	36	292 29	128 97	421 16
Seaver	2	30 75	19 30	50 05
Préfontaine	2	11 68	8 36	20 04
St. Michel	3	12 98	8 73	21 71
Mignonne	6	36 81	23 11	59 92
Havre	18	134 43	61 08	195 51
Logan	1	24 62	17 39	42 01
Marlborough	8	41 86	33 90	75 76
Ste-Catherine	77	331 41	242 51	573 92
Iberville	1	8 68	5 84	14 52
	283	1502 13	951 32	2453 45

Schedule.—COST OF LAYING SERVICE PIPES.—Continued.

OF STREETS.	No. OF SER- VICES.	WAGES.	MATE- RIALS.	TOTAL.
RUEL WAHD.		\$ Cts.	\$ Cts.	\$ Cts.
16.....	8	6 24	20 33	26 57
.....	3	73 64	12 45	86 09
.....	4	53 68	11 20	64 88
.....	17	88 22	35 39	123 61
.....	12	49 20	40 36	89 56
.....	6	44 05	22 19	66 24
.....	62	76 89	52 11	129 00
.....	3	33 63	10 16	43 79
.....	3	27 07	13 26	40 33
.....	1	13 84	5 76	19 60
.....	4	21 01	18 41	39 42
.....	20	113 85	70 30	184 15
.....	6	64 51	22 57	87 08
.....	9	89 00	54 96	143 96
.....	16	50 29	49 36	99 65
.....	2	21 22	6 78	28 00
.....	23	130 05	81 25	211 30
.....	3	46 44	9 80	56 24
ad.....	22	77 04	69 64	146 68
.....	31	198 22	105 92	304 14
rs.....	4	16 85	14 35	31 20
.....	1	11 26	4 14	15 40
.....	4	35 85	26 80	62 65
.....	38	166 06	144 09	310 15
	252	1508 11	901 58	2409 69

RECAPITULATION.

AVERAGE COST
OF EACH SERVICE.

S.	No. OF SER- VICES.	WAGES.	MATE- RIALS.	TOTAL.	WAGES	MATE- RIALS.	TOTAL.
		\$ Cts.	\$ Cts.	\$ Cts.	\$ Cts.	\$ Cts.	\$ Cts.
.....	16	107 56	51 77	159 33	6.72	3.24	9.96
.....	23	87 14	77 93	165 07	3.79	3.39	7.18
.....	2	56 95	13 86	70 81	28.47	6.93	35.40
.....	126	937 09	508 28	1445 37	7.43	4.03	11.46
.....	274	2312 95	1332 54	3645 49	8.44	4.86	13.30
.....	328	2081 31	1254 69	3336 00	6.34	3.82	10 16
e.....	162	1587 54	566 57	2154 11	9.80	3.50	13.30
.....	293	1970 68	1061 75	3032 43	6.72	3.63	10.35
.....	425	1909 27	1661 66	3570 93	4.49	3.90	8.39
diste....	650	3927 15	2129 22	6056 37	6.04	3.28	9 32
.....	283	1502 13	951 32	2453 45	5.30	3.36	8.66
.....	252	1508 11	901 58	2409 69	6.00	3.58	9.58
	283	17987 88	10511 17	28499 05	8.294	3.96	12.254

No. 19 Schedule.—RECAPITULATION OF TOTAL COST OF I
MAIN AND SERVICE PIPES.

WARDS.	\$ Cts.
East.....	270 03
Center.....	165 07
West.....	5925 63
St. Ann.....	80056 25
St. Antoine.....	91432 66
St. Lawrence.....	29124 43
St. Louis.....	30115 92
St. James.....	52437 07
St. Mary.....	34973 88
St. Jean-Baptiste.....	15634 77
Hochelaga.....	7669 22
St. Gabriel.....	29537 17
Total.....	\$377351 60

TEST MADE WITH ARCHIBALD MINE COAL, FURNISHED BY HENRY DOBELL & CO. WITH THE LEADWATER DEVICE IN COMMISSION.

Engine started.	Engine stopped.	Time of pumping	Counter at start.	Counter at stop.	Counts made.	Avg. strokes per minutes.	Coal consumed in lbs.	Lbs. of water raised to Rsvr.	Lbs. of coal raised to Rsvr.	Total lbs. of water raised to Reservoir	per lbs. of coal.	Water meter at start	Water meter at stop.	Cubic feet of water evaporated	Lbs. of water evap. p. lbs. of residue found.	Percentage of residue.	Coal consumed per sq. ft. of grate bars per hr.	Coal consumed per H. P. per hr.	Average temp. of feed water.	Average water pressure in lbs.	Average steam pressure in lbs.
7.15 a m	5.15 p. m	10 hrs	087318	066154	8,836	58 60	17 620	2750.3	48,598	000	22958.0	24459.0	1501.0	5 65	1,751	9.7	23.8	3.04	184.5	85	107

Foot lbs. duty per 100 lbs. of coal 58,851.562.

B. D. McCONNELL, Esq.

Supt. Water Work.

REMARKS.—As you will perceive by the large residue found, there is much in the coal that is not combustible, owing to which it was found necessary to clean the fires after about seven (7) hours run. There was no trouble in keeping up the steam to the required pressure necessary to run the engine full speed.

D. KEARNEY,

Engr. Low Level Pumping Works.



ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1891

Compliments of

B. D. McConnell,

Superintendent Montreal Water Works

Montreal :

EUSÈBE SENÉCAL & FILS, PRINTERS,

20, St. Vincent Street.

1892



ANNUAL REPORT

OF THE

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OF THE

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FOR THE

YEAR ENDING 31st DECEMBER 1891

PRINTED BY ORDER OF THE WATER COMMITTEE.



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1892



ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS
FOR THE
YEAR ENDING THE 31st DECEMBER 1891.

— — — — —
WATER WORKS OFFICE, CITY HALL

Montreal, March 1st 1892.

To the

Mayor, Aldermen and Citizens, of the City of Montreal.

GENTLEMEN,

I have the honor to report on the operations of the Water Department for the year 1891. The subject is taken under the following heads, viz : 1. Aqueduct.—2. Low Level Pumping Works.—3. Machine Shop and Brass Foundry.—4. Tail Race.—5. Pipe Track and Pumping Mains.—6. Reservoirs.—7. High Level Service.—8. Pipe Laying.—9. Maintenance of Distribution and Service Pipes, Hydrants and Fountains.—10. Consumption of Water.—11. Meters and House to House Inspection.—12. Administration.—13. Water Analyses.—14. General Remarks. Besides which in the appendix will be found the annual reports of the Assistant Superintendent, Chief Engineers of Pumping Stations, Head Foreman, with tables showing work done and expenditure for the year. Also reports on water analyses.

1. AQUEDUCT.

The ordinary work of cleaning the side and berm ditches, cutting weeds along the banks and repairing fences was done. One farm bridge, that at Penniston's, was rebuilt ; the cribwork abutments of all the farm bridges, but one, were renewed.

A considerable quantity of the old cap fence was altered to the common picket and rail fence.

The most considerable work done was the cutting down of the high spoil banks along the southern side of the Inland cut. These

were of such a height and so badly graded on top that the frost coming out in the spring or, a heavy rain at any time, washed great quantities of the earth into the aqueduct. These spoil banks have now been cut down to a height of 10 to 12 feet and the top given a fall towards the back ditch. The front slope has been trimmed and the road between the foot of the slope and the edge of the aqueduct has been re-graded with a fall to the berm ditch. In many places a low retaining wall has been built to hold up the foot of the slope. It is believed this work will save the aqueduct from further filling up from this source. The amount appropriated for this work was \$6000 and the expenditure exceeded this sum by about \$25.00.

There was in the appropriations the amount of \$1000 for the purpose of diverting the drainage of a part of the Lower Lachine Road from the "Still Water Basin." This money however reverted to the treasury, because obstacles intervened to prevent the work being done. In the first place, the trustees of the Fraser Institute who were interested from the fact that it was proposed to make a ditch across one of their farms, objected that the ditch, from its size, would be inconvenient and likely to interfere with farming operations. The plans were therefore changed so as to bring all the drainage along the public road, but here the Road Trustees wanted to make conditions which would have been difficult to comply with. The work therefore was postponed in the hope of finding some plan which would meet the approval of all parties interested. This would probably enhance the cost but may result in the adoption of a better scheme than either of the two proposed.

Two men were employed as constables to patrol the aqueduct grounds and keep disorderly persons away.

A woman who had been an inmate of the Protestant Hospital for the insane at Verdun got away from those in charge of her and was drowned in the aqueduct.

From several causes, the water had to be drawn down in the aqueduct more frequently than usual.

The average level of water during the year, at the entrance to the aqueduct was 38.65 being 10 inches lower than the previous year. The average for the month of June was nearly $2\frac{1}{2}$ ft. lower than for the same month in 1890.

2. LOW LEVEL PUMPING WORKS.

The repairs to the water power machinery were light, the most important being the re-cogging of the large bevel wheel on the counter shaft of No. 1 wheel. The cogs stripped on 28th April and the wheel was ready again and recommenced work, on 15th May.

No heavy repairs to wheels and pumps are anticipated this year though from the age and condition of Nos. 2 and 3 wheels their giving out would not be astonishing.

The steam pumping engines Nos. 1 and 3 worked well during the year and are now in good condition, some overhauling and perhaps repairs of a minor nature may be looked for.

A second feed pump for the Heines Battery of boiler was provided. The three sets of boilers are in good order, the No. 2, from long use, carries very low pressure and is in consequence not suitable for running No. 1 engine.

The buildings are in fairly good condition but require painting. Repairs of any magnitude are required. For details concerning the works see report of the Engineer at page 8 of appendix.

The total water pumped by water power during the year was 2,749,000 gallons with an expenditure of \$5,412.37 making 5.1% per million gallons raised to Reservoir or \$0.00 $\frac{51}{100}$ per million gallons raised one foot.

The quantity pumped by steam is 1,570,625,000 gallons at an expenditure of \$21,527.19 or \$13.70 $\frac{16}{100}$ per million gallons pumped which equals \$0.03 $\frac{11}{100}$ per million gallons raised 1 foot high.

Schedules Nos. 1 and 2 in appendix give work done and stores consumed by water power machinery; schedules 3 and 4 deal similarly with the steam pumping engines and No. 5 is a summary of predecessors.

The following is a table showing the cost of raising 1 million gallons of water 1 foot high by water power and by steam power for the year for the last 17 years and the average cost by each method for the same time.

YEAR.	BY WATER.	BY STEAM.
1875.....	\$0.0200.....	\$0.119
1876.....	0.0140.....	0.144
1877.....	0.0158.....	0.080
1878.....	0.0106.....	0.170
1879.....	0.0093.....	0.119
1880.....	0.0120.....	0.123
1881.....	0.0136.....	0.121
1882.....	0.0118.....	0.258
1883.....	0.0135.....	0.134
1884.....	0.0124.....	0.211
1885.....	0.0102.....	0.094
1886.....	0.0110.....	0.138
1887.....	0.0092.....	0.117
1888.....	0.0112.....	0.082
1889.....	0.0096.....	0.078
1890.....	0.0093.....	0.082
1891.....	0.0087.....	0.081
Average of 17 years.	0.0019.....	0.126

VI

MACHINE SHOP AND BRASS FOUNDRY.

The machine shop is in the same condition as last year, somewhat out of repair, the whole shop being repainted and whitewashing. Another lathe was added during the year.

The foundry also wants a little paint. This as well as the fact that we have been unable of late years to do all the work the Dept. requires, but are forced of great assistance, is a list of work turned out by the shop.

1000s hydrants.

1000s nuts and washers and 1 cent.

1000s valves.

1000s " "

1000s " "

1000s " "

1000s valve spindles.

1000s " "

1000s " "

1000s pneumatic stop valves.

1000s " "

1000s " "

1000s 2 way branches.

1000s " "

1000s steel nozzle drills.

1000s " "

1000s " "

1000s " "

1000s " "

1000s for air tube.

1000s " "

1000s pneumatic stop valves.

1000s " "

1000s couplings

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- 1 doz. brass plugs for Wells' lamps.
- 34 $\frac{5}{8}$ " bolts and nuts.
- 6 steel mandrills for expanding lead pipes.
- 16 hydrant brass sockets.
- 31 Wrt. iron keys for wheel No. 2.
- 17 " " gibs " "
- 8 new fire irons.

REPAIRS DONE IN MACHINE SHOP.

- 3 Boiler gauge cocks.
 - 5 Footpath augers.
 - 16 Hydrants.
 - 11 Air pumps for pneumatic stop valves.
 - 6-41 Pick axes.
 - 492 Tools for cutting and caulking pipes.
 - 261 Cold chisels.
 - 37 Fire irons.
- Brass castings delivered from Brass Foundry 19,747 $\frac{1}{2}$ lbs

4. TAIL RACE.

The ordinary repairs were not extensive, consisting of patching banks and fences at different points.

At the point where the old bed of the river St. Pierre crosses the weir bank of the Tail Race, there had been an opening left in the bank for the passage of water to supply cattle on the farms bounded by the said river St. Pierre, the Tail Race and the Lower Machine Road. The opening alluded to had a masonry abutment on each side and was spanned by wooden stringers and platform. Since the dam at the outlet of the Tail Race was removed the supply of water to the farms was quite insufficient. A year ago the bridge, which had been showing symptoms of decay, was thrown down by scour caused by a temporary dam in connection with another work and it was determined to do away with the bridge entirely and fill up the gap in the embankment, first putting in a cast iron pipe to give the required water to the farms, the supply end of said pipe to reach far enough up stream in the Tail Race to ensure a proper delivery. This was done, the pipe in the Tail Race being 12 inch and that through the bank with a 6 inch valve on the delivery side. The arrangement has worked satisfactorily. Most of the pipe used was second hand, consequently the work was inexpensive.

The banks of the Tail Race at several points are wearing away partly due to swift current and partly to steep slopes. At one point between the Wheel House and the Mullarky bridge, a deep hole

and a considerable piece of the bank carried away by the discharge from the river St. Francis. The work along the front with stone filling will be

the bridge over the Tail Race near the Wheel. The foundations have been injured by boulders thrown on the bridge since its construction. The condition of the bridge is what most requires attention. The Ry. Co. who own this bridge are responsible for its condition and made considerable repairs. They however promise to

the bridge over the Tail Race at Wellington undertaken in 1890 and suspended during winter 1891.

have been resumed early in May. The contractor commenced operations at that time, but did not begin until the end of May or beginning of June when he found necessary to go much deeper for the foundations than had been counted on. The dams leaked badly and were lowered several times and for several weeks the workmen to excavate for the foundations. A hard bottom was got, concrete, in which a layer of rubble was laid to within two feet of ordinary height the courses of masonry commenced. At this time an Alderman stated that this work was being done in an extravagant manner. The Council thereupon appointed a committee to investigate and report. The Committee reported to Council that the contractor had asked a certain sum to complete the work and that in accepting the offer, the work to be taken from him. The Council adopted the report and the offer was made and was rejected by the contractor, whereupon he was formally taken out of his control and put into the hands of the Superintendent of Water Works for completion. The work was disposed of the work on the 13th of June, about 5½ courses above foundation of western abutment; of the eastern abutment the foundations were completed. The superintendent proceeded with the work on the bridge to the Public on the 1st of August. The expenditure was \$27362.33 of which the Department paid \$22233 for work done under its immediate control, the balance \$5129.33 being paid to the St. Louis getting the balance \$23909.80. The large expenditure caused much unfavourable comment. There was a determined attempt on the part of some members of the Council to put the responsibility on the superintendent. The object of this however was not difficult to under-

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stand. It was to relieve from blame, their friends, members of the Water Committee, who had been instrumental in giving out the job on such terms as to put the Department in the hands of the contractor. However the chairman of the committee and another member declared distinctly that the Superintendent was free from blame. The settlement with the contractor was not arrived at without much discussion and it was near the end of December before the final payment was made.

5. PIPE TRACK AND PUMPING MAINS.

The final payment on Mr. Nicholson's contract for a culvert under the Grand Trunk Railway was made without any allowance for extra cost for supporting the track during construction as claimed by the contractor.

The 30 inch mains of Atwater Avenue just south of Notre Dame street were connected together and a branch was taken from one of them at Notre Dame street, as a feeder for the distributing main of that street. St. Antoine street distributing main was connected to the 30" pumping main at Atwater Avenue. As was the 16" of Dorchester street between Atwater Avenue and Sussex street.

The 24 inch pumping main of Centre and Montmorency streets was produced along Guy street to St. James and on St. James eastward to Windsor where it was connected to the 24 inch laid in St. James street in 1890, thus completing the line from the 30" main, corner of Atwater Avenue and Centre street, to St. Sulpice street, south of St. Paul.

The municipalities of St. Cunégonde and St. Henry have encroached on Atwater Avenue, by laying drains and water pipes in it. The City has taken no definite action in the matter.

The Road Department is also desirous to get possession of Atwater Avenue and reported to Council asking to have it handed over to them. As this Avenue was bought by the City for the Water Department to lay its pumping mains in, it seems proper that no underground rights in it should be parted with. There is no serious objection to the road being graded and macadamized and thrown open to the public, but the right to go beneath the surface should be denied to all unless by special permit from the Water Department.

The valves and valve chambers on the pumping mains were examined, the former oiled, and any necessary repairs to either were done. These were light however.

The most serious break that has occurred to a pumping main in this City, took place on the morning of Dec. 23rd, when a piece was blown out of the 24" main of St. James street near Imperial Avenue. The accident happened between 1 and 2 o'clock a. m.

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The street was immediately flooded from Mountain to Windsor. As the cover of the valve chamber at Windsor street had about 18 inches of water over it, that valve could not be closed. The valve at Guy street was also unavailable from surface water drained into the chamber so that the shutting for the break included many side streets and occupied about 4 hours during which time the pressure all over the City became almost nil and in many parts the pipes were empty. As soon as the break occurred the pumps were stopped and the reservoirs closed. The pump started again at about 5 o'clock and the reservoirs opened about the same time.

The fracture of the 24 inch pipe showed metal without flaw, a little over the specified thickness and fairly even. There had been an opening or closing of valves such as might be supposed to cause water hammer or in fact there is nothing to show what caused the leak. The piece blown out was about 5½ feet long and averaged 2 feet in width. It was a clean break of only one piece.

6. RESERVOIR.

Both reservoirs underwent slight repairs to the masonry, in the way of repointing the joints damaged by the action of the ice.

Nothing was done to the division wall of McTavish reservoir. This should be attended to and if possible made water tight, as it is important to be able to hold one side in reserve, whilst drawing off from the other.

A new fence was made at north east side of McTavish reservoir between the end of the retaining wall and the eastern gate.

The retaining wall along Carlton Road requires a new covering board along the greater part of its length.

Painting of fences at McTavish reservoir will be necessary this year.

A new hut was provided for the watchman at the Peel street reservoir.

7. HIGH LEVEL PUMPING STATION.

The dwelling requires some alterations made to closets, which are not in a sanitary condition. The closet of No. 1 engine room must also be overhauled and perhaps a new one put in.

The roof of coal shed leaks and must be repaired. The rest of the buildings are in good order.

The new boiler supplied by Mr. Wm. C. White was completed and in working order about the beginning of May. It is up to specification in all respects. In connection with it a blower was put up to be run by a water motor. This has not, so far, worked very satisfactorily, due probably to the small size of the motor; at all events the requisite speed is not attained. It is hoped this may

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be remedied by changing the size of pulleys and of water nozzle and possibly enlarging the feed pipe.

Schedules 6 and 7 in appendix, show the total number of gallons pumped during the year to have been 205,298,473 with an expenditure (see schedule 16) of \$5,808.34 being at the rate of \$28.43¹⁸/₁₀₀ per million gallons pumped or 13³⁵/₁₀₀ c. per million raised 1 foot. The cost of raising 1 million gallons 1 foot high was :

In 1876.....	\$0.240
1877.....	0.253
1878.....	0.355
1879.....	0.283
1880.....	0.274
1881.....	0.226
1882.....	0.256
1883.....	0.286
1884.....	0.318
1885.....	0.376
1886.....	0.250
1887.....	0.187
1888.....	0.197
1889.....	0.121
1890.....	0.135
1891.....	0.133
Average of 16 years..	0.243

For details as to work at the pumping station see report (page 12 in appendix) of Mr. Jas. Coleman, engineer.

8. PIPE LAYING.

The total length of cast iron pipes laid in the city during the year 1891 is 82,520 feet, equal to 15³/₄ miles, the weight of metal being approximately 3,300 tons of 2,240 lbs. each. The different sizes of pipes laid, their lengths and weights, and the number of valves of different sizes put in, are as follows :

	feet.	tons.	valves.
30 inch pipes	500	85	
24 "	1721	215	1
20 "	1800	172	1
16 "	3692	258	3
12 "	26430	1215	58
10 "	13492	445	33
8 "	32263	871	89
6 "	987	17	29
4 "	1635	19	72
Totals.....	82520	3297	386

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The daily average of 1890 was 14.40 millions, so that last year's consumption is about 7000 gallons per day less than that of '90. The average pumping by water power falls short of that of 1890 by 637,000 gallons, whilst the quantity pumped by steam power is increased by 629,000 gallons daily. This falling off in the water power pumping is accounted for by the fact that the average height of water in the river at the head of the aqueduct during the year, was 10 inches less than in '90, whilst for the month of June it was nearly 2½ ft. less than the same month in '90.

The purposes to which the water pumped is applied are as follows.

No revenue	{	Flooding private rinks.....	427,190	.41	
		Fires.....	14,432,000		
		Watering streets.....	65,664,000		
		Public fountains.....	41,852,160		
		Harbour latrines and drinking taps..	12,227,803		3
		Lubricating steps of turbines	17,542,744		
			<hr/> 152,155,897		

Metered and charged at meter rates.

	Mill of gals.
Factories & engines.....	160.10
Elevators	168.97
Railways	101.45
Schools, convents &c.....	26.05
Hospitals and Homes.....	7.04
Hotels	37.72
Church organs.....	6.96
Breweries	26.59
Miscellaneous.....	18.07
Outside municipalities.....	44.72
	597.75
Balance, that charged for at rates based on rental, being principally domestic consumption	4503.46
That producing no revenue.....	152.15
	5253.36

11. METERS AND HOUSE TO HOUSE INSPECTION.

A great number of worn out meters were got rid of during the year. There are some remaining which are not entirely reliable and must be weeded out as soon as possible.

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By order of the Water Committee some "Hersey" meters have been bought and are now on trial.

The total expenditure under the head "Meters" (see schedule No. 14) was \$10,602.24 a decrease of about \$200 from the previous year. The house to house inspection has gone on fairly well. A large increase in the number of Inspectors has been made in the last two years and a foreman has recently been placed over them. The latter appointment was very necessary and would have been made some years ago, but for the difficulty of finding a suitable man; that however was overcome. The other newly appointed inspectors were put on by the Committee. There are now twenty many inspectors. Better work could be done with fewer but properly selected men. The report of the assistant superintendent and the schedule No. 11 give detailed statements in regard to the subjects under this head.

12. ADMINISTRATION.

The year's expenditure is given in detail in schedule No. 18.

The amount taken from Revenue to meet cost of maintenance was \$164,516.31. That from "Loans" for permanent improvement was \$354,223. It was principally for pumping and distribution main hydrants and service pipes.

An assistant to the accountant was appointed temporarily and his appointment will probably be made permanent.

13. WATER ANALYSIS.

The reports of Drs. Ruttan & Johnston on the quality of the water supplied to the City of Montreal, based on a series of analyses covering one year, will be found in the appendix.

Samples of water for the same period were also furnished to Prof. Pfister but his report is yet incomplete and cannot be given this year. A table of the results of his analyses for the first few months has been received and will be found in the appendix.

14. GENERAL REMARKS.

The general condition of the works has been good and efficient during the year.

There is generally not enough money granted for repairs: painting, the consequence being most of the property has a somewhat uncared for appearance. I believe it would be sound policy to keep the buildings, fences, ditches, &c., &c., always in a first state of repairs. Even in point of economy it would be preferable because repairs not attended to in time increase in cost, at a rapid rate.

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lack of water power for pumping during 1891 should arouse Water Committee to urge on the Council the completion of the aqueduct, which would furnish power sufficient to do the lighting for the City as well as pump the water required, at the interest on which, would be less than the amount paid for lighting alone. But as such a work takes time, more power should be provided at once. It ought to be ready by January next.

There will be further improvements in pipe laying required this year. Many four inch mains should be replaced by larger mains where there are dead ends to eliminate in various parts of the City. Important work too is that of carrying a High Level 12" main from Prince Arthur street from University to Cadioux and up to join the High Level main of that street between St. Baptiste and Rachel. This is very important because at present there being only one line to the North Western part of St. Baptiste ward, it is deprived of water whenever repairs are made on its single supply main.

Due to the many changes in the supply mains and positions of valves, it was considered advisable to train some men as valve-men with that view 4 men were detailed (2 for the eastern and 2 for the western half of the City) to go all over their divisions, find valves, note the positions in books and mark on the opposite side the distance out from line of street to valve. Whenever repairs are required these men will be employed and from this time it is hoped they will soon become familiar with the work available in any case of emergency.

I have the honor to be

Your obedient servant,

B. D. McCONNELL,

Supt. M. W. W.



APPENDIX

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REPORT of J. O. ALFRED LAFOREST, Assistant-Superintendent of Water Works, on Meters and House service inspection, for the year 1891.

B. D. McCONNELL, Esq.

Supt. M. W. W.

DEAR SIR,

I herewith beg to submit, for your information, the following brief report upon the Meter and House-service inspection branches of the Water Department for the year 1891.

METERS.

The number of meters in use, at the end of the year, was 702 showing an increase of 9 over 1890. The City owns 646, the other 56 belong to private individuals or companies.

There were 81 new places metered and 66 meters in use were discontinued.

There were 130 changes of meters made for various reasons some being out of order and others too small.

The number of meters damaged by frost was 16.

In all these cases the damages were charged to the tenants, as there is a by-law holding them responsible for all damages to the instruments on their premises.

The Department purchased during the year 53 new meters. viz:—

26 CROWN:	{	5	$\frac{1}{2}$	inch
		5	2	inches
		8	3	do
		8	4	do
15 EMPIRE:	{	10	$\frac{1}{2}$	inch
		3	$\frac{3}{4}$	do
		2	2	inches
12 HERSEY:	{	9	$\frac{1}{2}$	inch
		3	1	do
Total.....		53		

There were also 4 meters purchased by private parties ; viz :—

3 CROWN { 1 2 inches
 { 1 4 do
 { 1 6 do

1 EMPIRE : 1 1 do

Total..... 4

The following is a list of meters that were completely worn out and sent to scrap.

44 Union : { 36 $\frac{5}{8}$ inch
 { 8 1 do

33 BOTANY UNION { 4 $\frac{5}{8}$ inch
 { 18 $\frac{3}{4}$ do
 { 3 1 do
 { 3 $1\frac{1}{2}$ do
 { 2 2 inches
 { 1 3 do
 { 2 4 do

5 CROWN : { 3 $\frac{3}{8}$ inch
 { 1 $\frac{1}{2}$ do
 { 1 1 do

11 WORTHINGTON : { 8 $\frac{5}{8}$ inch
 { 1 $1\frac{1}{2}$ do
 { 2 2 inches

11 GEM : { 74 $\frac{1}{2}$ inch
 { 22 $\frac{3}{4}$ do
 { 12 1 do
 { 2 $1\frac{1}{2}$ do
 { 1 2 inches
 { 1 4 do

4 CONTINENTAL : 4 $\frac{5}{8}$ inch

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The same meters as before (11) were used this year at the harbour latrines and drinking fountains.

... were also the same 5 meters at the low level
 ...

The water sold by meter last year and the previous
 as follows:

	1890 Millions of Gallons.
Factories and engines.....	160.08
Elevators.....	168.97
Railways.....	101.45
Schools, convents &c.....	26.06
Hospitals and Homes.....	7.04
Hotels.....	37.72
Church organs.....	6.92
Breweries.....	26.59
Miscellaneous.....	18.07
Outside city limits.....	44.72
Totals	597.75

Showing a diminution of 1.47 per cent with 1890

HOUSE SERVICE INSPECTION.

On the 16th December 1890 the committee appointed
 inspectors so that we started the year 1891 with 9 Inspe

On the 24th November the committee appointed 5
 pectors making in all 14.

On the same date the committee appointed the fo
 pector that I asked in my last year's report.

The last days or weeks of the year were employed to
 new men and preparing them all to the new system of i
 This new system of inspection consists in having al
 working on the same ward and under the constant contr
 foreman instead of being one in each ward, as before.

With this new system of inspection we will visit the
 in 3 months instead of 8 or 9 months as before.

The result of this inspection was the discovery and stoppage of waste from defective fittings as enumerated below, viz :

	1890.	Gall per hour.	1891.	Gall per hour.
Estimated out Bib cocks out of repair 3763	wasting	42485	4180	wasting 53227
Urinals cocks. do 82	do	1561	61	do 1148
Ball " do 2006	do	37614	3334	do 67606
Stop " do 54	do	817	68	do 1045
Closet " do 191	do	5238	189	do 4623
Basin " do 263	do	3357	382	do 4607
Closet valves do 126	do	2860	373	do 8252
Water closets do 36	do	1143	20	do 307
Pipe burst 741	do	12906	676	do 12872
		<u>108041</u>	<u>9283</u>	<u>153687</u>

The following irregularities were also found :

Taps open to prevent freezing	18	wasting	675	gallons per hour.
" " flush drains.....	16	"	630	do do
	<u>34</u>		<u>1385</u>	

Using water illegally for building purposes.....	52
" hand hose illegally.....	164

There were 399 sounds heard on service pipes. In all cases the reports were made to the shop and repaired by the Department if the leak was on the street.

Every case of illegal use of water was arrested as soon as discovered.

The number of prosecutions in the Recorder's Court was 91 against 58 last year.

The number of houses inspected was 84159.

COMPARISON OF METER RATES WITH RATES BASED ON ASSESSED RENTAL.

Gallons.

The total quantity of water pumped in 1891 was ... 5,253,374,740

giving no direct revenue :

oding private rinks &c.....	437,190	
es.....	14,432,000	
terring streets.....	65,664,000	
olic fountains.....	41,852,160	
rbour.....	12,227,803	
steps of turbines.....	17,542,744	
		<u>152,155,897</u>
Balance producing revenue.....	5,101,218,843	

at charged for at meter rates ;

ilways (including Street Railway)...	101,442,523	
ctories and Engines.....	160,179,554	
Elevators (exclusive of those at Hotels and Railways.....)	168,974,265	
Breweries.....	26,592,985	
Hotels.....	37,721,684	
Schools, convents & colleges.....	26,054,389	
Hospitals and Homes.....	7,038,124	
Churches (for organs).....	6,962,785	
Miscellaneous (Livery stables, rinks restaurants &c).....	18,072,756	
Outside City Limits.....	44,719,992	
		<u>597,758,438</u>
Total.....		597,758,438

Balance being that charged for at rates based on rental and special rates and including waste.....	4,503,460,405
--	---------------

The revenue from water in 1891 was :—

That from metered water including rent of meters ...	\$109,933 54
Revenue from water based on rental and sundry special charges.....	634,160 12
Total revenue for 1891.....	744,093 66

Gallons.

Water sold at rates based on rental...	4,503,460,405
Revenue from same.....	\$634,160.12
being at the rates of 14 $\frac{1}{100}$ cents per 1,000 gallons.	

Water sold at meter rates.....	597,758,438
Revenue from same.....	\$109,933.54
being at the rate of $18\frac{3}{8}\%$ cents per 1,000 gallons.	
Total water sold.....	5,101,218,843
Revenue	\$744,093.66
being at the rate of $14\frac{3}{8}\%$ cents per 1000 gallons.	

The monthly inspection and reading of all meters in use has been kept up as usual.

Your obedient servant,

J. O. ALFRED LAFOREST,

CIVIL ENGINEER,

Assistant-Superintendent,

M. W. W.

MONTREAL WATER WORKS OFFICE }
City Hall,
21st March, 1892.

LOW LEVEL PUMPING STATION, JAN. 14TH 1892.

B. D. McCONNELL, Esq.

Superintendent Water Works.

DEAR SIR,

I respectfully beg to submit my annual report for the year ending December 31st 1891.

No 1 WHEEL HOUSE.

All the repairs that at present appear necessary are some patching to the flooring and walls the latter of which, with the ceiling require washing.

Nos. 2, 3 & 4 WHEEL HOUSE.

The repairs to this building, will also consist of patching the floor and washing the walls.

THE WORK SHOP.

The extension of this building is in the same condition as when last reported, nothing having been done to it, the interior requires painting and white washing, and some other slight repairs. There was another new lathe added to the shop tools, which is rendering good service to the department.

THE BRASS FOUNDRY.

This building is in fair condition requiring only an application of white wash.

THE DWELLINGS.

No repairs were done to these buildings excepting the renewing of the back stairs. The exterior is sadly in need of painting.

No 1 ENGINE HOUSE.

This building is in good condition, excepting the paint, coats of which would very much improve its appearance.

No. 3 ENGINE HOUSE.

This building is in good repair at present.

THE BOILER HOUSES.

Are in fair condition, the repairs will be slight.

THE COAL SHED.

This building is in fairly good condition, but is also badly in need of two coats of paint. The weigh house attached is very much frost sprung and in need of considerable repairs.

THE GROUNDS.

The grounds are in good condition, with the exception of the slope between the Wheel and Engine Houses, which should be newly sodded. A new stairs leading to the Engine House will be necessary.

No. 1 WHEEL.

This wheel, as anticipated, stripped the cogs of the large bevel wheel on the counter shaft on the 28th of April, and started on the 15th of May with cogs renewed, since which time the wheel has worked almost constantly performing good service. It is at present in fairly good condition.

No. 2 WHEEL.

This wheel started on the 24th of March after undergoing heavy repairs, and worked very well but required frequent renewing of the gibs and keys of the upright and radical arms. The plunger of the center pump was taken out and repaired and now nuts furnished.

The bucket valve was refitted, put in good order and replaced in position and has worked well since. A crack made its appearance in the wrought iron rim of the wheel on the 20th of August which does not appear to be of a serious nature. Only the usual repairs are likely to be required during the year.

No. 3 WHEEL.

This wheel may be credited with very good behaviour during the year, the repairs were many but slight. It is at present working well.

No. 4 WHEEL.

This wheel also did very well and appears at present able for another year's work, without much overhauling.

No. 1 ENGINE.

This Engine has worked well during the year, and at the time of writing is working splendidly. Of course, after the wheat pumping season is over the usual overhauling will be necessary which, with an engine of such magnitude is a work considerable. I am of opinion that it will be necessary to refit the low pressure pistons which will require the employing of one or two mechanics to assist with the work. The new steam pump for feeding the boilers is giving good satisfaction.

No. 2 ENGINE.

This engine is also in good order, and working well and will only require such repairs as are consequent upon the proper keeping up of running machinery.

No. 1 BATTERY OF BOILERS.

This battery worked very satisfactorily during the year. The doors were furnished with new cast iron linings and four of the steam joints remade. The baffle bricks were also removed and the furnaces rebuilt. The boiler fronts, steam and feed pipes on sections, will require painting and the building white washing.

No. 2 BATTERY OF BOILERS.

This battery did not work during the year, they are of little service to the works, being built principally to furnish steam to the two engines now removed, they cannot be used for furnishing steam to No. 1 Engine as their pressure capacity is only 40 lbs., whereas that required to run the engine is 100 lbs per square inch.

They are in fairly good order however and can be used to furnish steam to No. 3 Engine when required, they will also require to be painted.

No. 3 BATTERY OF BOILERS.

This battery is also in good order, they are the ones used to furnish steam to No. 3 Engine. I cannot at present see that they will require more than the ordinary attention during the year.

THE PORTABLE STEAM PUMP AND BOILER.

This boiler is in the same leaky condition as when last reported nothing having been done to it, in fact it is much worse having

been considerably damaged by the breaking away of the platform on which it was placed while working at the Tail Race Bridge.

The furnace door, the injector pipes, valves and connections, the steam gauge and try cocks were broken off and lost in the Tail Race. All the connections between the steam drum and boiler were also broken.

It was sent to the Eagle Foundry where it was repaired in a hurry. The pump and its parts are much worn, as is natural when it is considered that it has done twenty years service. The splendid service done by the centrifugal pump used at the laying of the main, on St. James street west last summer clearly demonstrates that it is the best kind of pump for such service. I would therefore recommend that no time be lost in furnishing the Department with two four inch centrifugal pumps, also the proper boiler and appurtenances for working the same, as our old one cannot be considered reliable for much service.

In conclusion, I beg to render you my sincere thanks for the able assistance you so kindly gave me in the discharge of my duty.

The whole respectfully submitted,

I have the honor to be, Sir,

Your obedient servant,

D. KEARNEY,

Engineer.

HIGH LEVEL STATION, McCLURE RIVER

January 1902

To E. H. McCLURE, Esq.,

Sgt. U. S. A.

Sir,

I beg to submit my annual report for the year ending the 31st Dec 1901, on the work done, conditions and requirements at McClure and High Level Barrages and High Level Pumping Station.

THE WORTHINGTON ENGINE

In the same condition as last year, and requires but a slight repair. It worked about 100 days last summer.

THE GILBERT ENGINE

This engine is working every day, has worked well throughout the year and gave no trouble other than the coming off of the air pump bucket, which had to undergo a light repair. Two valves were replaced. I got 4 brass check valves made in case of any giving out. I want a set of wooden bushes for the pistons in of the valves in the heaters connected on the condenser, the present bushing is giving out. We have to remake the points on the steam pipes occasionally. owing to the high steam we cannot make the joints tight.

I got 26 brass valves in the high pressure pump three years ago they were worked well and show but little sign of wear.

I ordered 100 brass valves and 50 springs in pumps during year. A new pattern of an improved pattern will be required for fitting the fans, the present one is difficult and expensive to keep in order.

THE BOILERS

The new boiler, ordered for last year, has been built and put in by W. C. White. It has worked well and gives satisfaction. It being a larger one than the Gilbert boiler, the present feed pump connected to this engine is not large enough to feed it. We will want to connect the Worthington feed pump to the hot water supply in connection with this boiler, the water heater connected with this boiler, are brass tubes they are more lasting than iron and a better heating surface. The Gilbert boiler is in good working order, and has worked well all year in turn with the new one.

The tubes of water heater under this boiler are worn out, we will require a new one. I would recommend the new one to be made of brass tubes; the bends and flanges of the old one can be put in the new one.

THE OLD ENGINE HOUSE.

Is in good repair except the water course outside which is all broken up by frost. I would recommend a new one to be laid with wooden blocks.

THE NEW ENGINE HOUSE.

Is in good repair. I require a pair of travelling cranes or instead four iron girders to lay on the cross beams which would answer as well and come much cheaper. The place is much in need of a store room to keep supplies.

THE BOILER HOUSE.

The new porches and the sky lights add much to the comfort of the room. There is a leakage of surface water coming through the back walls which wants to be stopped as soon as possible. This room is badly in need of a concrete floor; also a cast iron covering under flue of old boiler, it was covered with flagstones which are all broken up with heat. There has been a water motor and fans placed in this room to give a forced draught, which adds much to quickness in getting up steam.

THE COAL SHED.

The roof of which is leaking and requires fixing this coming summer, otherwise this building is in good condition.

THE McTAVISH RESERVOIR

The supply from this reservoir was continually on the city during the past year, with exception of 3 hours, 25 minutes, on morning of December 22nd owing to a break in main pipe on St. James street, it was cut off at 1.15 and let on again at 4.40 a.m.

The front wall of this reservoir underwent a light repair during the summer, the joints that were injured by ice were grouted and pointed with cement and are in good repair. The old portion of centre-wall wants to be repaired, it leaks so badly from one side to the other that we cannot make a reserve in either. The masonry in back wall requires grouting and pointing with cement, also to be puddled with clay, back of wall, as considerable surface water

is getting into the reservoir. The Revetment wall was repaired last summer, this wall requires a new covering, it will take about four hundred 14 in. boards and fifty, 3 in planks, the same to be covered with tar. The new fence made on north side of reservoir affords great protection to the grounds. The banks and slopes were kept in good order during the past summer, the weeds cleared out, and grass cut regularly. It would be a great improvement to lay macadam on road on reservoir bank from entrance on north side to the coal shed for the convenience of delivering coal, as the carting keeps the banks cut up and hard to keep in order.

The electric light on the bank is a great advantage to the place, and saved the delay of lighting lamps etc., the night the new pipe broke. I would recommend two more lights on the premises, one on the northwest side, and one on northeast side, this would light the whole premises.

There is a small boat wanted to enable us to get at leaves etc., floating on the water.

The wooden fence around reservoir properly requires painting.

THE HIGH LEVEL RESERVOIR

Underwent some repairs last summer in pointing and grouting the joints of the masonry which had been injured by ice, and the leakage through front wall was repaired. There is some surface water running into Reservoir through back and end walls which will require attention next summer.

There was a new sentry house put up for watchman which is a great improvement on the old one.

THE DWELLING

Requires some sanitary improvements, the extension of the engine room closet to top of building and the closets of dwelling placed therein. This would cause the pipes to be removed from one of the principal rooms of the house which they at present pass through and which causes a disagreeable, dangerous smell.

The outside windows want painting they have not been done for years.

The steam heating pipes in dwelling are leaking and should be renewed.

THE TELEPHONES.

This service was very good during the past year and our prompt communication with Low Level pumpings and all other stations of the Department owing considerably to having a branch of the Bell Telephone in addition to our private one.

THE SCALES

Want considerable repairing, in fact a new one would be cheaper than trying to fix the present requirements. One of the beams broke last summer while weighing coal, we made a temporary repair by bolting it together with iron straps. Should you decide on getting a new one I think wrought iron beams would last better than wooden ones. The scales were tested twice last year by Revenue Inspectors, on account of them breaking down.

THE VALVE HOUSE.

The walls require some pointing outside. The roof, doors, windows, ceiling and cornices to be painted. The floodgates in overflow passage are decayed and want renewing. A new water float and chain, are required, the present ones are pretty well worn out, also some iron braces to stay valve-rods in well, they are temporarily fixed with wooden ones.

In conclusion I beg to call your attention to the quality of the Welsh coal supplied to us this year, it was of a very poor quality and very hard to get along with, from the present mode of screening it is necessary to have it passed through two inch mesh screen, before delivery.

The whole respectfully submitted.

I have the honor to be,

Sir,

Your obedient servant,

JAMES COLEMAN.

WATER WORKS SHOP, JANUARY, 1892.

B. D. McCONNELL, Esq.,

Superintendent Water Works.

DEAR SIR,

I respectfully submit the report in detail of the work done my supervision during the year ending December 31st 1891

PIPE LAYING.

New main pipes were laid in the following streets as follows

24" MAINS.

Gay Street, from William to St. James Street.

St. James, from Guy to Windsor Street.

Bleary, from St. Catherine to Sherbrooke.

St. Sulpice, from near St. Paul to Commissioners.

A 24" connection was made across Sherbrooke on St. Street.

Two gaps left on Atwater Avenue's new 30" main were 12" connections were made across Notre-Dame and St. Street. This new 30" pipe was tapered down and connected St. Antoine Street 12."

20" MAINS.

Guy Street, from St. James to Dorchester Street.

Amherst, from Craig to Notre-Dame.

Pine Avenue, from Arcade to St. Urbain.

Atwater Avenue, from 30" main South of Dorchester main on Dorchester Street.

16" MAINS.

Dorchester, from Fort Street to Atwater Avenue.

Amherst, from Sherbrooke to Roy Street; besides 12" 10" mains in different streets.

NEW MAINS.

New main pipes will have to be laid in many streets for reasons; amongst the most important are the following:

30" MAINS.

Connect new 30" to old 30" on Atwater Ave. at St. Antoine

24" MAINS.

Commissioners from St. Sulpice to Berri Street.
 Berri from Commissioners to Notre-Dame Street.
 Notre Dame from Berri to Papineau Road.
 St. Denis from Sherbrooke to Pine Avenue.
 Lower 24" across, C. P. R. bridge at Ontario street.

20" MAINS.

Park Avenue from Sherbrooke to Pine Avenue.
 Pine Avenue " St. Lawrence to St. Denis.

16" MAINS.

St. Patrick from Island Street to Cote St. Paul connecting with one of the 30" pipes at Atwater Ave.
 Cadieux Street from Prince Arthur to Duluth.
 Notre Dame from Atwater Avenue to Fulford.
 Besides many others of smaller diameter too numerous to mention here.

REPAIR TO MAINS.

St. James street 24" main broke during the night of the 22nd of December last and caused considerable damages, the cause of aforesaid break could not be ascertained. This pipe as well as all the pipes laid by our Department are put to a severe test before they are laid. This is the only break that occurred this year on the 24" mains.

The breaks on smaller pipes were as follows: two 12", one 10", one 8", ten 6", and twenty-five 4". The cause of so many breaks on small pipes is mostly due to old age, and also to sewer cuts made across said pipes.

Four	24"	joints blown out
One	16"	" "
Sixteen	12"	" "
Eight	10"	" "
Six	8"	" "
Twenty-six	6"	" "
Thirty-four	4"	" "

One 6" and 9-4" valve spindles were repaired.

Considerable repairs were done to the pipes in the Exhibition grounds. Four iron hydrants were put in, in place of the old wooden ones. The pipe on the south side was extended. One hydrant was put in on Park Ave. near Mount Royal Avenue.

HYDRANT IMPROVEMENT.

New hydrants were put in on the line of all the main pipes laid during the year. New hydrants were also put in many streets on the old mains.

Two novel hydrants were put in for watering purposes; but they can also be used for fire.

The old kind hydrants with wells and large iron covers should be all changed for new patent hydrants of our pattern, as the wells cause the hydrants to freeze and the iron covers are very dangerous when ice forms on them exposing pedestrians to serious injuries.

Eight hundred and twenty-nine hydrants were reported frozen in January. Seven hundred and nineteen in February, four hundred and sixty-two in March, and seventy-nine in December 1890, giving a total of 2069 hydrants reported frozen for the whole winter 1890 & '91.

New hydrants will be wanted in many parts of the city where they are now too far apart.

No gully shafts should be allowed near the hydrants; and the should be at least six feet from them.

One hundred and seventy-five hydrant valves were renewed. Seventeen hydrant rods were broken and repaired. The inexperience of some people using the hydrants in making drains &c., one of the causes of so many rods being broken. The contraction by frost has also been the cause of a few of the breaks.

SERVICE REPAIRS.

Sixty-five services were found broken across sewer cuts. Sixty-four couplings were found leaking. These in most cases were caused by being disturbed in making sewers &c.

Fifty-eight services were burst in walls generally caused by the action of lime on solid pipes, also by frost.

One hundred and fifty-five ground cocks were renewed for old age; or tarred worn out.

Five hundred and forty rotten wooden boxes were replaced by iron ones. Fourteen hundred and seventy-three wooden boxes were renewed, where permanent sidewalks were made.

Two hundred and four old kind stopcocks were replaced by new pneumatic ones. There has been only one service frozen outside last winter, and one hundred and fifty frozen inside houses also fifty-one services frozen in wall. The cause of so many services freezing inside houses, and in walls is the general neglect of people, who think of protecting their cellars only when every thing is frozen in them.

There were forty-six false reports investigated. One thousand and fifty seven leaks were repaired on the services. The causes of so many leaks are so numerous, that it is impossible to state them all in this report; but the two immediate ones are the contact of sewers and old age.

FOUNTAINS &c.

The Place d'Armes fountain has been removed to the Western park.

A new trough and drinking tap were put in on Mount Royal avenue near the exhibition grounds. The drinking taps in Fletcher's field should be replaced by handsome iron ones; and the pipe should be extended to the north side of the orchard and another drinking tap placed there. This would be a great convenience to people who now have to go a great distance for water when they are pic-nicking.

All the fountains should be repainted early in the spring, I think that one coat of paint will be sufficient.

The two faced drinking taps, laid on the exhibition grounds were removed to St. Denis street opposite St. James church and the one that was there, was put in Wellington square.

Two show fountains should be put in Dominion square. One on the north side, where a large basin could be made similar, but larger, to the one in Victoria square and the high level pipe which now enters the square could be extended to it, where a fine display of water could be made. The six or eight jets of aforesaid fountain could be fed from the low level reservoir; leaving only the show jet to be fed from the high level reservoir; and one on the south without a large basin.

The fountain which is in Bellerive square, could be placed in Dufferin square, and a large one put in its place.

The Papineau square fountain could not be kept playing last summer on account of its defective bottom. The bottom should be concreted, and new revolving jets placed instead of the present spray jets.

The trough on St. Catherine street at Philips square should be removed, as it is now a nuisance to Mr. Morgan's new store. Six new troughs and drinking taps should be distributed in different parts of the city.

Three drinking taps made on the model of the one now in use opposite St. James' church on St. Denis street, should be distributed in different parts of the city.

me to thank you in my name, also in the name of all the
of the Water Department under my supervision, for
able advice, and the impartial manner you treated us all.

Respectfully submitted,

Your obedient servant,

CHAS. LAGACÉ,

Foreman.

ROCK GATES, AQUEDUCT, JANUARY 1892.

B. D. McCONNELL, Esq.,

Superintendent Montreal Water Works.

DEAR SIR,

The following is a statement of work done during year 1891. The fences along the line of Aqueduct were repaired, also the approaches to bridges; Peniston's bridge was renewed and painted. The crib work to all the bridges along the line was renewed, except Cross' bridge. Two new platforms were put on the bridge at "Rock Gates" for taking out stop logs. The castings and wood work on Inland cut bridge were painted. Many of the bridges were jacked up and straightened. Cross' bridge was planked. The flood gates at entrance to Inland cut were raised and lowered several times during the year, also the usual cutting of weeds was done. The spoil banks on south side of Inland cut were cut down, and a dry wall made at the foot of the slope, where required. The berm ditch was remade all along the same slope. Dunn's ditch was cleaned last fall. There was quite a lot of earth taken off the Aqueduct road opposite where spoil banks were cut down. There were also 52 pagées of picket fence made out of the old cap fence.

The whole respectfully submitted,

I have the honor to be,

Dear Sir,

Your devoted servant,

EDWARD SALLY,

Guardian of Aqueduct.



MONTHS
1891.

	pumping. Hrs. M.	Revolutions.	Volume pumped.	in air vessel.	In pounds.					77.5000.	100.0000.
January	744.00	595601	138775033	78	139.50	.....	186.00	.....	36.00	.....	79110
February	667.00	520738	121331954	77	126.00	.....	118.00	.....	25.33	.....	75770
March	744.00	604150	140766950	78	189.50	30.00	158.00	.....	36.00	.....	75760
April	679.30	611730	142535090	76	126.00	... ..	126.00	.....	23.75	.....	69430
May	380.00	339524	79109092	75	72.00	.....	118.00	.....	32.00	.....	18470
June	464.45	420136	97891688	75	99.00	.....	102.00	.....	26.50	.....
July	673.15	583724	136007692	75	128.25	43.00	118.00	.....	25.80	.....
August	744.00	596588	139005004	76	139.50	48.00	124.00	.....	29.38	.....
September	686.10	535835	124849555	75	130.50	.....	118.00	.....	31.00	.....
October	744.00	569001	132577233	76	139.50	.....	145.00	.....	26.37	.....	18940
November	711.45	534976	124649408	78	135.00	.....	150.00	.....	25.50	.....	41010
December	703.50	547033	127458689	77	137.25	40.00	155.00	.....	34.00	.....	76040
Total	7942.15	6,459,036	1,504,955,888	.....	1512.00	161.00	1613.00	.....	311.63	.....	454,530
Average				76							
Last year (1890) ..	8298.25	6,657,807	1,551,290,031	.....	1565.87	225.00	1832.00	.....	305.68	.....	602,680
Average "				76							

No. 2.—SCHEDULE SHOWING THE WORK OF THE BREAST WHEEL No 2 AND TURBINES Nos. 3 AND 4.

MONTHS 1891.	TIME OF PUMPING				REVOLUTIONS.				Gallons pumped.	Pressure in air vessel.	In pounds.		
	Breast wheel.		Turbine.		Breast wheel	Turbine.					Castor oil.	Coal oil.	Cotton waste.
	No. 2.	Hrs. M.	No. 3.	No. 4.		No. 2.	No. 3.	No. 4.					
January.....	.....	598.50	739.40	.....	443745	904365	77	14349650	77	130.50	186.10	23.00
February.....	.....	315.35	26.50	.....	218675	29419	76	34893934	76	56.25	118.00	15.00
March.....	173.20	733.10	325.15	136653	566031	413752	76	139431904	76	150.01	153.00	25.00	
April.....	718.45	715.20	715.20	585888	587836	986624	75	258560816	75	270.00	131.00	30.33	
May.....	739.55	744.00	744.00	589416	630389	1135060	76	278146300	76	279.00	131.00	33.00	
June.....	423.15	444.40	479.35	341379	369638	732242	75	168403328	75	182.25	102.00	24.88	
July.....	668.10	670.05	673.15	529273	530683	966805	76	240018718	76	251.25	118.00	26.10	
August.....	732.00	741.25	744.00	558901	557007	955161	76	247298074	76	276.75	124.00	29.50	
September.....	586.00	494.35	685.35	501436	347721	854492	75	199161544	75	249.71	118.00	32.75	
October.....	635.45	105.10	744.00	453495	71451	919811	74	156795754	74	164.25	145.00	27.60	
November.....	139.35	685.00	720.00	99806	459903	844942	77	155501944	77	164.25	150.00	27.37	
December.....	430.10	391.00	651.35	317168	272615	802828	75	156331092	75	189.01	149.01	23.70	
Total.....	5246.55	6638.50	7249.05	4,113,418	5,055,691	9,545,501	.....	2,177,793,662	.....	2,366.25	1,625.00	318.23
Average.....	.....	.....	.....	.....	.....	.....	76	.....	.....	.....	.....	.....
Last year (1890)	6198.50	6,832.50	7,982.15	4,750,063	5,099,382	10,534,128	.....	2,363,653,728	.....	2,545.75	1,832.00	349.93
	.....	.....	.....	.....	.....	.....	76	.....	.....	.....	.....	.....

MONTHS 1891.	Pumping time.	Revolu- tions.	Gallons pumped.	Coal used in pounds.			Pressure in air vessel	IN POUNDS.				
				For pumping	For banking fire.	To raise 1,000,000 gallons.		Castor oil.	Cylinder oil.	Seal oil.	Coal oil.	Cotton waste.
January	295.45	242437	133340350	435790	51730	3656	77	68.50	232.00	62.13	88.00	24.00
February.....	318.45	245583	135070650	481910	21940	3730	74	51.75	176.00	53.25	168.00	19.25
March	232.35	197304	108517200	393320	35320	3949	75	49.50	152.00	26.62	96.00	15.00
April	31.45	23030	12666500	42790	6220	3869	75	9.00	24.00	.....	.....	.....
May.....	162.40	138936	76414800	262160	29880	3822	75	38.25	168.00	8.88	16.00	15.00
June.....	208.15	236685	130176750	453170	10280	3560	75	60.50	224.00	35.50	80.00	12.33
July	211.10	181699	99934450	332010	24870	3572	74	42.75	152.00	17.75	32.00	15.25
August	230.10	193387	106362850	361260	34000	3716	75	51.75	176.00	8.87	16.00	12.25
September	206.45	262582	144420100	455320	40720	3435	75	58.50	176.00	35.50	40.00	16.25
October	339.00	302147	166180850	550110	56450	3652	75	49.50	104.00	49.50	72.00	16.37
November	325.45	275707	151638850	521350	38180	3690	73	47.25	136.00	44.37	80.00	15.00
December.....	211.50	170334	93683700	301130	41570	3658	75	42.75	160.00	62.12	80.00	15.37
Total	2,954.25	2469831	1,358,407,050	4,590,620	391,160	.....	.....	570.00	1,880.00	404.49	768.00	176.07
Daily average.....	.....	.....	.....	.....	.....	3 692	75	.....	.....	.....	.....	.....
Total last year ('90)	2,535.35	2020259	1,111,142,450	3,572,280	287,960	.....	.....	652.66	1,977.00	328.12	704.00	138.00
Daily average.....	.....	.....	.....	.....	.....	3,474	77	.....	.....	.....	.....	.....

NO. 4.—SCHEDULE SHOWING THE WORK OF STEAM ENGINE NO. 3.

MONTHS 1891.	Pumping time.	Revolu- tions.	Gallons pumped.	Coal used in pounds.			Average pressure on pump piston.	IN POUNDS.				
				For pumping	For banking fires.	To raise 1,000,000 gallons.		Caster oil.	Cylinder oil.	Seal oil.	Coal oil.	Cotton waste.
January	10.00	80740	3528548	20820	.....	5900	75	2.25	8.00	.....	.....	.....
February	172.00	135466	59063176	279220	13650	4959	75	33.75	120.00	17.75	96.00	10.37
March	67.00	49009	21367924	127780	9490	6424	75	9.00	56.00	8.87	24.00	9.00
April	19.20	13821	6025956	33410	3760	6168	75	2.25	15.00	.....	8.00	.....
May	65.45	50874	22181064	110930	9300	5419	75	-1.25	40.00	.....	16.00	8.00
June	158.40	114300	49834800	253390	31150	5709	75	27.00	144.00	8.87	8.00	15.00
July	25.40	17437	7602532	34130	4220	5044	75	4.50	32.00	.....	8.00	.....
August	13.55	10364	4518704	23510	4160	6123	75	4.50	24.00	.....	8.00	8.00
September	36.25	21699	9460764	48130	5470	5665	75	6.75	24.00	8.88	8.00	10.38
October .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
November	35.55	23818	10384648	58080	12060	6754	75	4.50	24.00	8.87	8.00	.....
December	55.50	41859	18250524	92260	9230	5562	75	4.50	24.00	8.87	16.00	.....
Total	660.30	486,737	212,218,640	1081,660	102,490	.....	75	110.25	512.00	62.11	192.00	60.75
Average .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Last year (1890) Average	773.55	527,132	229,839,552	1122,980	133,210	.....	75	128.16	1,032.00	67.74	160.00	110.00

459.

No. 2.—SCHEDULE—MONTREAL WATER WORKS, 1901.

TOTAL FOR EACH MONTH.									
BY STEAM POWER.									
MONTHS.	BY WATER POWER.						Percent- lage.		
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By Water.	By Steam.	By Water and by Steam.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By Water.	By Steam.	By Water and by Steam.
January.....	138776033	.....	65674260	77773390	133340350	3528548	289294683	136686898	419093381 67.34 32.66 38.79 56.00
February....	121331954	.....	32533900	2530034	135070650	59063176	156225888	194133826	350339714 44.59 55.41 38.01 36.00
March.....	140760950	20234644	83624588	35582672	108517200	21367924	280198854	129885124	410083978 68.35 31.65 30.01 36.20
April.....	142333090	86711424	86099728	84849664	12666500	6025956	401093906	18692456	419786369 95.55 4.45 40.82 37.11
May.....	79109092	87233368	93297572	97615160	76414800	22181064	35725392	98595864	450851256 78.37 21.63 41.10 37.15
June.....	97891638	50534092	54706434	62972812	130176760	43834800	266095016	180011350	446106560 59.65 40.35 39.29 36.24
July.....	13607692	78324404	78641084	82145939	9993450	7602832	376926410	107536982	485503392 77.76 22.24 38.06 36.42
August.....	13900504	82717792	82437036	82143846	10638350	4518704	385303678	110881554	407185232 77.69 22.31 38.38 36.09
September....	124849550	74212528	6163708	73480312	14440100	9460764	324011103	153880894	477891967 67.75 32.25 37.79 35.48
October.....	132577283	67117260	10574748	79103746	160180800	Not work'g	280372887	160180800	45553837 63.62 36.48 37.23 35.39
November....	124649408	14771288	68065644	72665012	151633850	10384648	280151352	102025408	443174850 63.35 36.65 37.06 35.17
December....	127488859	46940864	40347020	69043308	98683700	18250524	283789781	111034224	395734005 71.72 28.28 37.76 36.01
Total.....	1,004,955,388	608,785,864	748,094,712	820,913, 86	1,358,407,060	212,218,640	3,682,749,050	1,070,635,680	5,263,374,740
Daily average	4,123,165	1,067,906	2,049,574	2,349,076	5,371,663	881,421	10,089,723	4,303,064	14,392,807 70.10 29.90 38.05 36.10
365 days.									
Total 1890....	1,551,369,031	708,000,324	764,708,836	905,035,866	1,111,142,456	225,870,552	3,914,922,769	1,340,972,002	5,255,894,761
Daily average	4,360,052	1,926,053	2,007,695	2,482,013	3,044,226	622,670	10,725,816	3,673,896	14,399,713 74.49 25.51 39.48 36.47

MONTHS.

No. 6.—SCHEDULE SHOWING THE WORK OF ENGINE No. 1. (WORTHINGTON) AT THE HIGH LEVEL PUMPING STATION.

MONTHS 1891.	Pumping time.	Revolu- tions.	Gallons pumped.	Coal used in pounds.			Average pressure in pump piston.	Castor oil.	Valvo- line.	Cotton waste.
	Hrs. M.			For pumping	For banking fires.	To raise 1,000,000 gallons.				
January.....
February.....
March.....
April.....
May.....
June.....	19.00	28354	340248	4033	.....	11855	100	.....	.....	.....
July.....
August.....
September.....
October.....
November.....
December.....
Total.....	19.00	28,354	340,248	4,033	.....	.....	.....	.....	.....	.....
Average.....	11,855	100	.....	.....	.....
Last year (1890)...	204.00	274,434	3,293,208	40,874	5,937	.....	.....	8.00	99.00	26.00
Average.....	14,001	100	.....	.....	.....

MONTHS 1891.	time.		Revolu- tions.	Revolutions minute.	Gallons pumped.	Pressure in air	COAL BURNED IN POUNDS.				oil.	waste.
	Hrs. M.						For pumping fires.	To raise 1,000,000 gallons.	For heating.	In pounds.		
January.....	135.30		324553	39.9	15578544	100	47299	12400	3832	2515	112 50	30.00
February... ..	117.40		270739	38.3	12995472	100	42020	11400	4110	.....	103.50	30.00
March.....	134.45		308149	.....	14837685	100	45666	12600	3927	480	105.00	30.00
April.....	129.00		299927	.....	14441784	100	42936	12200	3819	.....	82.00	26.00
May.....	153.55		350146	.....	16859881	100	50684	12400	3741	.....	127 50	25.00
June.....	170.00		375148	.....	18063752	100	58570	14600	3914	.....	132 50	25.00
July.....	162.30		382560	.....	18400545	105	58965	14200	3975	.....	139.00	25.00
August.....	164.45		393098	39.7	18928063	105	63992	13400	4088	.....	139.00	25.00
September.....	194.00		463029	.....	22295304	105	73080	12400	3966	.....	161.00	25.00
October.....	161.00		371590	38.4	17892426	108	66844	13400	4485	.....	141.00	30.00
November.....	152.30		338157	.....	16282595	108	60278	12200	4452	427	119.00	30.00
December.....	167.00		360993	.....	17382174	108	74373	12600	4647	1175	137.00	25.00
Total.....	1,842.35		4,238,089	.....	203,958,225	.....	684,707	153,800	.....	4,597	1,499.00	325.00
Average.....	.....		.....	.....	.....	103	.....	.....	4110	.....	.....	.....
Last year (1890)	1,706.30		3,804,127	.....	182,597,826	.....	587,399	131,400	.....	9,437	1,682.50	462.00
Average.....	.....		.....	.....	.....	109	.....	.....	3936	.....	.....	.....

**DULE No. 9.—REPAIRS TO MAINS, HYDRANTS AND VALVES
DURING THE YEAR 1891.**

Description.	24"	16"	12"	10"	8"	6"	4"	Hydrant valves renewed.	Hydrant rods broken.
es broken.....	1	0	2	1	1	10	25		
lown out.....	4	1	16	8	6	26	34		
ves renewed.....	0	0	0	0	0	0	0		
indles renewed.....	0	0	0	0	0	4	9	175	17

REPAIRS &c. TO SERVICES.

Couplings leaking.	Burst in wall.	Ground cocks renewed.	Wooden boxes re- placed by iron ones.	Wooden boxes renewed where new foot- path laid.	Services choked.	Old kind cocks re- placed by pneumatic valves.
64	58	155	540	1473	86	204

es from cellar de on t.	Frozen outside.	Frozen inside.	Frozen in wall.	False reports investi- gated.	Leak on services from various causes undefined.
	1	150	51	46	1057

hydrants (5 noz.) put in during year 1891	187
ent hydrants in position up to January 1892 (3 noz.)	70
ent hydrants in position up to January 1892 (2 noz.)	530
ent hydrants (2 noz.) put in during year 1891 (new work)	35
ent hydrants in position up to January 1892 (5 noz.)	441
tic valves put in during year 1891 (new work)	2,366
tic valves put in up to January 1892 (new work and repairs)	15,536

**ANTS FROZEN DURING YEAR COMMENCING JANUARY 1891,
ENDING DECEMBER 1891.**

y.	February.	March.	December.	Total hydrants frozen.
	719	462	79	2089 times.

h shops, included in this report.

No. 30.—Showing the Repairs done to Main Pipes, Hydrants and Valves during year 1891.

LOCATION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Water Dome and Caisson	Jan.	2	1	1	Put new valve	Old one worn out.
Wellington and Blenheim	"	3	1	1	Recorked joint	Joint of hydr. blown out
Ontario and German	"	4	1	1	Replaced by another hydrant	Rough usage.
St. Patrick and Napoleon	"	5	1	1	Put new rod and valve	"
McLeod street	"	6 1/2" Main	1	1	Put on bonnet	Bonnet blown off (No stay)
Amburst at Ontario	"	7 1/2" "	1	1	Put in a new piece	Main broken across
						20" main resting on it
Grand Trunk	"	8	1	1	Replaced rod and valve	Broken by frost
St. Cath. cor. City Councilors	"	9 1/4" Main.	1	1	Put in a new piece	Broken by intercepting sewer
McGill College Grounds	"	10	1	1	Put in a new tee pipe	Shifting from heavy pressure.
Ontario and Sanguinet	"	11	1	1	Took out old hydrant	Not in use.
Chenilleville and Viere	"	12	1	1	Put in new valve	Old one worn out.
McGill Coll. and St. Catherine	"	13	1	1	" "	" "
St. Cath. st. W. of Guy	"	14	1	1	Replaced rod and valve	Broken by frost.
Sherbrooke and Mackay	"	15 1/2" Main.	1	1	Put in a new piece	Broken by settling of dr. cut.
Sherbrooke and Laval	"		1	1	Recorked joint	Joint blown out.
Ontario and Panet	"		1	1	Took out old hydrant	Not in use.
Aylmer and Mayor	"		1	1	Put in new hydrant	Broken by rough usage.
Craig and Beaudry	"		1	1	Reshipped rod	Rod unsipped rough usage.
Maisonneuve and Ontario	Jan.	22 1/2" Main.	1	1	Put in a new piece	Broken by settling of dr. cut.
Alexander and St. Catherine	"	23 1/4" "	1	1	" "	" " sewer.
St. James and Dominion	"	24	1	1	Put in new valve	Value worn out.
St. Catherine and Fort	"	25	1	1	" "	" "
Amburst st. at Ontario	"	26	1	1	" " new brass	Sand hole in brass.
Sherbrooke and Laval av.	"	27	1	1	" " leather washer	Washer worn out.
Centre and St. Andrew	"	28	1	1	" " valve	Value worn out.
Mayor and Aylmer	"	29 1/2"	1	1	Repacked valve	Breaking worn out.

<i>Mansfield at Dorchester</i>	Jan.	29 th	12 th	Main.	Put in new piece.....	.....	.....
<i>Mountain and Sherbrooke</i>	"	1	12	.....	Old spindle taken out.....	.....	.....
Notre Dame and Shaw.....	Feb.	1	.....	.....	Put in new brass.....	.....	.....
Mignonne and Parh-nals.....	"	2	.....	.....	" " valve.....	.....	.....
Craig past St. Radegonde.....	"	2	.....	.....	" " " ".....	.....	.....
Sherbrooke and Plessis.....	"	3	.....	.....	" " " ".....	.....	.....
St. Dominique opp. No. 233.....	"	4	1	.....	Put in a new piece.....	.....	.....
Sherbrooke at Montreal Col.....	"	4	.....	.....	Reshipped rod.....	.....	.....
St. Catherine near Closse.....	"	5	12	.....	Put in a new piece.....	.....	.....
Ontario near Frontenac.....	"	5	6	.....	Recalked joints.....	.....	.....
St. Catherine E. of Amherst.....	"	6	6	.....	Put in a new piece.....	.....	.....
St. James st. E of Windsor.....	"	7	.....	.....	" " " valve.....	.....	.....
Osborne and Drummond.....	"	8	.....	.....	" " " ".....	.....	.....
Wellington and Queen.....	"	9	.....	.....	" " " ".....	.....	.....
Dorchester and St. Mark.....	"	10	.....	.....	" " " ".....	.....	.....
Opp. No. 16 St. Gabriel.....	"	11	4	.....	Put in new piece.....	.....	.....
Queen and Wellington.....	"	12	10	.....	Repacked valve.....	.....	.....
William near St. Thomas.....	"	13	.....	.....	Put new valve.....	.....	.....
Peel above Sherbrooke.....	"	14	.....	.....	" " " ".....	.....	.....
Sherbrooke and Stanley.....	"	15	.....	.....	" " " ".....	.....	.....
Lagauchetiere and Beaudry.....	"	16	6	.....	Put in new piece.....	.....	.....
Dorchester and Cathedral.....	"	17	.....	.....	" " " valve.....	.....	.....
Montcalm and Robin.....	"	19	4	.....	" " " piece.....	.....	.....
Notre-Dame and St. Gabriel.....	"	20	.....	.....	" " " valve.....	.....	.....
Drolet st. at Roy.....	"	21	.....	.....	" " " ".....	.....	.....
William and Shannon.....	"	22	.....	.....	" " " ".....	.....	.....
Dorchester and Panet.....	"	24	.....	.....	" " " ".....	.....	.....
Notre Dame and Moreau.....	"	25	.....	.....	" " " ".....	.....	.....
Colborne near Canal.....	"	26	6	.....	Recalked joint.....	.....	.....
St. Lawrence and St. Cuthbert.....	"	26	.....	.....	Put in new valve.....	.....	.....
Lafontaine and Champlain.....	March	3	.....	.....	" " " ".....	.....	.....
Aylmer and Mayor.....	"	4	.....	.....	" " " ".....	.....	.....
Notre-Dame and l'Allemant.....	"	5	.....	.....	" " " washer.....	.....	.....
Sherbrooke opp. Laval av.....	"	6	.....	.....	" " " valve.....	.....	.....
Sherbrooke and University.....	"	7	.....	.....	" " " ".....	.....	.....

Causes unknown.
 Unused valve.
 Sand hole in brass.
 Valve worn out.
 " " "
 " " "
 Cause unknown.
 Rough usage.
 Defective pipe.
 Joints blown out.
 Settling of intercepting sew
 Valve worn out.
 " " "
 " " "
 " " "
 Old age.
 Packing valve.
 Valve worn out.
 " " "
 " " "
 Old age.
 Valve worn out.
 Settling of drain cut.
 Valve cut by stone.
 Valve worn out.
 " " "
 " " "
 " " "
 Joint blown out.
 Valve worn out.
 " " "
 Not properly clean when m'de
 Bad washer.
 Valve worn out.
 " " "
 " " "

No. 10—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1891.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Pine av. fr. Peel to Côte des Neiges	March 8	12"	1	1	Renewing valve chambers	New level.
Shorbrooke and University	" 10	"	"	"	Put in new valve.	Valve worn out.
St. Catherine and Peel	" 10	"	"	"	"	"
Pine Ave. and Carleton Road	" 11	"	"	"	"	"
Opp. 126 Murray	" 13	4"	"	"	"	"
Aqueduct below Dorchester	" 13	"	"	"	"	"
St. James and St. Martin	" 14	"	"	"	"	"
Argyle Av. at end	" 15	"	"	"	"	"
Sherbrooke and St. Chas. Bor.	" 16	"	"	"	"	"
Pine Av. cor. Peel	" 17	"	"	"	"	"
" and Redpath	" 18	"	"	"	"	"
St. Antoine and Cathedral	" 18	"	"	"	"	"
Sherbrooke and Hutchison	" 19	"	"	"	"	"
Pine Av. and Mance	" 20	"	"	"	"	"
Napoléon and Knox	" 23	"	"	"	"	"
St. Antoine and Seigneurs	" 25	4"	"	"	"	"
Atwater and St. Catherine	" 26	12"	"	"	"	"
Burns and University	" 27	"	"	"	"	"
Victoria at Burnside	" 28	"	"	"	"	"
Sanguinet and Roy	" 29	"	"	"	"	"
Volteurs and Craig	" 30	"	"	"	"	"
Cadieux and St. Jean-Bte.	April 1	8"	"	"	"	"
Lawrence and Guilbault	" 2	"	"	"	"	"
St. Antoine and Fort	" 3	"	"	"	"	"
St. Antoine and Fort	" 4	"	"	"	"	"
St. Antoine and Fort	" 5	"	"	"	"	"
around at Station Black	"	"	"	"	"	"

Living below St. Antoine.....	April	7	.....	Put in new valve.....	Valve worn out.
Richmond Sq.....	"	8	.....	" " "	" "
Carterie and Monteslm.....	"	8 1/2	.....	Repacked valve.....	Spindle worn out.
Slap on and Montbrooke.....	"	9 1/4	.....	Put in w spindle.....	Spindle worn out.
Slack brooke and M teale.....	"	9 1/2	.....	Repacked valve.....	Valve packing worn
St. Catherine and Atwater Av.....	"	10 1/2	.....	Repacked joint.....	Brown out : pipe si
St. Catherine and Phillip Sq.....	"	11 1/6	.....	Put in a new piece.....	Setting of intere: p
St. Antoine and Richmond Sq.....	"	12 1/2	.....	" " " valve.....	Old valve worn out
Chatham and St. Antoine.....	"	13 10	.....	" " " ".....	" "
Opp. No. 110 Colborne st.....	"	13 1/4	.....	Reculped joint.....	Joint blown out.
Busby and Craig.....	"	14 1/4	.....	Repacked valve.....	Valve worn out.
Albert and St. Felix.....	"	14 1/6	.....	Reculped joint.....	Joint blown out.
University opp. 509.....	"	15 1/2	.....	" " " ".....	" "
Guy in Bulmers Yard.....	"	16	.....	Put in new valve.....	Valve worn out.
Noire Dame and Place d'Armes.....	"	17 1/6	.....	" " " piece.....	Pipe shifted.
St. James and Windsor.....	"	18 24	.....	Run a new joint.....	Joint too small.
Inspector and St. James.....	"	19 1/2	.....	Took a piece of wood from.....	Under gate of valv
Pine Ave. and Simpson.....	"	21 1/2	.....	Lower d main.....	Too high for new l
Legauchetiere and Mansfield.....	"	22	.....	Rebuilt hydr. Chamber.....	Chamber fell in.
Mignonne and Panet.....	"	23 1/6	.....	Put in new valve.....	Valve worn out.
Water st. at Tob. fact.....	"	24 1/4	.....	" " " ".....	" "
Fu fort and Delisle.....	"	25 1/2	.....	Reculped joint.....	Cause unknown.
Harbour in Gas. Co's yd.....	"	26	.....	Put new valve.....	Broken ; rough use
Opp. No. 409 Aqueduct.....	"	26 1/4	.....	Reculped joint.....	Joint blown out.
Lusignan and Noire-Dame.....	"	27 1/4	.....	Repacked valve.....	Packing worn out.
Park Av. at Sherbrooke.....	"	27	.....	Rebuilt hydrant chamber.....	Chamber fell in.
Foundling and McGill.....	"	28	.....	Put new cover.....	Stone worn out.
Amherst and Sherbrooke.....	"	28	.....	" " " ".....	" "
No. 112 Maisonneuve.....	"	29 1/6	.....	Reculped joint.....	Joint blown out.
Marlborough.....	"	29 1/4	.....	Put in new piece.....	Defective pipe.
St. Peter opp. St. Ann's Market.....	"	30 10	.....	Reculped joint.....	Joint blown out.
St. Alexander and Bernard.....	"	30	.....	Put in valve.....	Valve worn out.
MacKay st. at Dorchester.....	"	30	.....	Straightened rod.....	Ice und. Val bent b
Bonsecours N S. Notre-Dame.....	May	16	.....	Repacked valve.....	Packing worn out.
Opp. No. 373 Jacques-Cartier.....	"	24	.....	Put in a new piece.....	Defective pipe.

No. 10.—*Bolobula* showing the *Bopele* done by Main Pipe, Tachenta and Water Column east 100 ft.

NAME	DATE	VAL	REMARKS	REMARKS	REMARKS
Chapman, Mary and Laura	1874	100	100	100	100
Warrick and Paul	1874	100	100	100	100
St. Andrew and Langdon	1874	100	100	100	100
Dorchester and Franklin	1874	100	100	100	100
Dorchester and St. Alexander	1874	100	100	100	100
Oliver and Penelope	1874	100	100	100	100
Langdon and Sanguin	1874	100	100	100	100
Dorchester and Sanguin	1874	100	100	100	100
St. Alphonse near St. Catherine	1874	100	100	100	100
St. Catherine near St. Catherine	1874	100	100	100	100
St. Catherine near St. Catherine	1874	100	100	100	100
St. Louis and Bonsecours	1874	100	100	100	100
St. Lawrence and Dorchester	1874	100	100	100	100
St. Martin and William	1874	100	100	100	100
St. Catherine and St. Catherine	1874	100	100	100	100
Ontario E. of Harbour	1874	100	100	100	100
St. Alphonse and Dorchester	1874	100	100	100	100
German at Desmarais	1874	100	100	100	100
Dorchester and Sanguin	1874	100	100	100	100
Sherbrooke and Mountain	1874	100	100	100	100
Vailie and St. George	1874	100	100	100	100
Water past Barclay	1874	100	100	100	100
Sherbrooke and Simpson	1874	100	100	100	100
Forfar street	1874	100	100	100	100
St. Antoine and Richmond St.	1874	100	100	100	100
St. Catherine and Peel	1874	100	100	100	100
Ontario and St. Dominick	1874	100	100	100	100

St. Patrick and Atwater st.	May	26/24"	Put stone cover	Recalked joint	Wood one rotten.
Coronation Lane.	"	26/6"	Recalked joint	Recalked joint	Joint blown out.
St. Jean-Bte and Carleux.	"	27	Repaired hydrant rod	Repaired hydrant rod	Tough usage.
St. Lawrence and Mary Ann	"	27	Put in new valve	Put in new valve	Valve worn out.
Guy at Dorchester	"	28	"	"	"
Forfar st.	"	28	"	"	"
Notre-Dame and Dezery	"	29	"	"	"
Napoléon and Knox	"	29	"	"	"
St. Lawrence and Vitré	"	30	"	"	"
William and Dalhousie	"	30/12"	Raised hydrant	" length	Setting of sewer c
St. Catherine E. of Dezery	"	31	Rebuilding valve chamber	Rebuilding valve chamber	Hydrant too low.
Vallee and St. George	"	31/1"	Recalked joint	Recalked joint	Chamber fell in.
Ontario and Visitation	June	1/12"	Put drain to hydrant	Put drain to hydrant	Joint blown out.
St. Mark and Bayle	"	1	Recalked joint	Recalked joint	Had no drain.
Chaboillez Square	"	2/10"	Planked over meter chamber	Planked over meter chamber	New drain cut.
DeLery street	"	2	Put in new spindle	Put in new spindle	Spindle broken.
Visitation and Craig	"	3/6"	" valve	" valve	Valve worn out.
St. Math w opp. Bayle	"	3	"	"	"
Lagauchetière and Bleury	"	4	"	"	"
Vallee and St. George	"	4	"	"	"
St. Dizier and DeBresoles	"	5	"	"	"
Noire-Dame and Murray	"	6	"	"	"
Craig opp. St. François-Xavier	"	7/4"	Renewed valve	Renewed valve	Old one no good.
Opp. No. 128 Murray	"	7/4"	Put in a new piece	Put in a new piece	Old age.
St. Monique below Dorchester	"	9/12"	"	"	Setting of drain c
Dorchester W. of Fort	"	10/12"	Put new stone cover	Put new stone cover	Old one worn out.
St. Catherine W. of Metcalfe	"	11/12"	Recalked joint	Recalked joint	Joint blown out.
St. James W. of Cathedral	"	12/12"	"	"	Pipe shifted.
Windsor and Dorchester	"	12	Put in new valve	Put in new valve	Valve worn out.
St. Augustin street	"	13	"	"	"
Opp. No. 322 Bourgeois	"	13	"	"	"
St. Patrick and St. Etienne	"	14/6"	" piece	" piece	Setting of sewer c
St. Catherine and St. Elizabeth	"	14	" valve	" valve	Valve worn out.
St. Denis and St. Julie	"	14	"	"	"
Cursol st	"	15	"	"	"

[illegible]

Wellington and Dalhousie.....	"	"	Reducing sluice in hydrant.....	Sludge now
St. Sulpice and Desbrosses.....	"	26	Put in new valve.....	Valve worn
Pin. Av. and Mance.....	"	27	Recalked joint.....	Hydrant joint blown
St. Antoine opp. Inspector	"	28	Put in new valve.....	Valve worn out.
Hunter street.....	"	29	Put in new hydrant.....	Defective casting.
St. Lawrence and Ontario	"	"	Repacked valve.....	Packing worn out.
College and McGill.....	"	30	Rebuilt valve chamber.....	Chamber fell in.
Windsor and St. Antoine.....	"	31	Put iron frame.....	Paving
Wolfe and Robin.....	July	1	Put in new valve.....	Valve worn out.
McGill and College.....	"	"	Put in new rod.....	Through usage.
Ontario and Jac-Cartier.....	"	"	Took away hydrant.....	Hydrant abandoned.
" and Pessis.....	"	"	"	"
" and St. Christophe.....	"	"	"	"
St. Lawrence and Dorchester.....	"	2	Connecting drain to hydrant.....	Was not connected.
Ontario and Pinel.....	"	"	Recalked joint.....	Joint of hydrant blo
Sherbrooke last West.....	"	"	Put in new spindle.....	Spindle worn out.
St. Catherine and Dezery.....	"	"	Valve renewed.....	Valve worn out.
St. An're ab. Ontario.....	"	3	Put in new valve.....	"
Manufacturer and Roppy.....	"	"	"	"
St. James and Dominion.....	"	"	"	"
Latour st. 2nd.....	"	4	Renewed valve chamber.....	Fell in
Phillip Square.....	"	4	Took out hydrant.....	Not used.
St. Catherine and Mance.....	"	"	Rebuilt valve chamber.....	Chamber fell in.
St. Maurice and McGill.....	"	4	Rebuilt valve stone.....	To level.
Harbour and No're-Dame.....	"	5	Put in new piece.....	Settling of sewer cul.
St. Catherine and Sanguinet.....	"	6	Repacked valve.....	To level.
St. Louis and Bonsecours.....	"	"	Put in new valve stone.....	Valve worn out.
St. Catherine at Grey Nunery.....	"	6	Repacked valve.....	Valve worn out.
St. Catherine and Deloimier av.....	"	6	Put in new valve stone.....	Stone worn out.
Papineau and Notre-Dam.....	"	10	Repacked valve stone.....	To level.
University opp. McGill College.....	"	4	Took out 4" valve.....	Not used.
St. Catherine and Mountain.....	"	7	Bringing valve covers to level.....	Paving.
" and Crescent.....	"	12	"	"

[illegible]

Albert and St. Felix	16"	Put in new valve	Valve worn out.
Commissioners and Grey Nun.	16	"	"
Sauter St. 1st.	16	"	"
Common and Colborne	16	Put two fender posts	To protect hydrant.
Ann and Wellington	17 1/2"	Renewed valve chamber	Falling in.
St. Catherine and Union Av.	17 1/2"	Raising valve cover	Paving.
" and German	17 1/2"	"	"
St. James and Victoria Sq.	17 1/2"	"	"
Frontenac and Ontario	17 1/2"	"	"
Harbour and Notre Dame.	17 1/2"	"	"
Papineau and Dorchester	17 1/2"	"	"
St. Eienne at G. T. Office	18	Put in new valve	Valve worn out.
Carleton Road	19 1/2"	Itcaulked joint.	Joint of suction pipe.
Ottawa and St. Thomas	20	Put fender posts	To protect hydrant.
Craig and Galt	20	Cleaned hydrant drain	Drain choked.
Common and King	21	Put in new valve	Valve worn out.
St. Antoine and Mountain	21 1/2"	Cased spindle	Too hard.
St. Urbain and St. Catherine	22 1/2"	Bringing stone to level	Paving.
Parthenais and	22 1/2"	"	"
Inspector and St. James	23 1/2"	"	"
Papineau and Lagauchetière	23 1/2"	"	"
Commis. at Custom House	24 1/2"	"	"
Vallee and St. George	25	Renewing hydrant chamber	Falling in.
St. Felix and St. James	25	"	"
Mario Anne Cor. Berri	26	Cleaned drain to hydrant	Hydrant drain choked.
Dorchester and Windsor	26	Put in new valve	Valve worn out.
St. James and Mountain	27 1/2"	Repaired valve	Packing worn out.
Common and Queen	27	Put drain to hydrant	No drain.
Ottawa and Ann	27 1/2"	Itcaulked joint	Joint blown out.
Notre Dame and Colborne	27	It paired hydrant rod	Itough usage.
Richmond Cor. G. T. R.	28	"	"
Notre Dame and Harbour	28 1/2"	"	"
Basin and Seigneurs	28 1/2"	Raised valve stone	To new level.
Balmoral and St. Catherine	28 1/2"	Lowering valve stone	"

No. 10.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1891.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
St. Lawrence and St. Catherine....	Aug.	28 12"	1	1	Lowering valve stone.....	To new level.
Lagauchetière and Bleury.....	"	28 6"	1	1	Renewed valve chamber.....	Falling away, old age.
Cherrier and Maple.....	"	28 6"	1	1	Raised valve stone.....	New level.
St. Paul and McGill.....	"	30 12"	1	1	Lowered valve stone.....	"
Suzanne and St. Catherine.....	"	31 12"	1	1	Raised " " " " " " " " " "	"
" " " " " " " " " "	"	31 4"	1	1	" " " " " " " " " "	"
Bleury " " " " " " " " " "	Sept.	1 12"	1	1	" " " " " " " " " "	"
Guy and William.....	"	2 4"	1	1	Recaulked joint.....	Joint blown out.
" at Canal.....	"	2 24"	1	1	" " " " " " " " " "	"
Notre-Dame and Inspector.....	"	3	1	1	Took out hydrant.....	Not in use.
Roy and Cadieux.....	"	3	1	1	Put in new valve.....	Valve worn out.
Collège and Inspector.....	"	4	1	1	Recaulked joint.....	Joint blown out.
St. James and Seigneurs.....	"	4	1	1	Put in new valve.....	Valve worn out.
Latour and Busby.....	"	4	1	1	" " " " " " " " " "	"
St. Urbain and Mount-Royal av.....	"	4	1	1	Repacked valve.....	Packing of valve worn out.
Desrivères Ave.....	"	5	1	1	Put in new valve.....	Valve worn out.
Aqueduct and St. James.....	"	5 1"	1	1	Repacked valve.....	Worn out.
Shannon and William.....	"	6"	1	1	Recaulked joint.....	Joint worn out.
St. Peter and St. Paul.....	"	6 10"	1	1	Raising valve cover.....	To new level.
St. Urbain and St. Catherine.....	"	6 4"	1	1	" " " " " " " " " "	"
St. Catherine E. of St. Denis.....	"	12"	1	1	" " " " " " " " " "	"
Dubord and St. Hubert.....	"	7 6"	1	1	Recaulked joint.....	Joint blown out.
Cherrier and St. Denis.....	"	7 6"	1	1	Put new iron frame.....	Stone worn out.
St. Denis and Craig.....	"	12"	1	1	Raised valve cover.....	New level.
Sanguinet and St. Catherine.....	"	8 12"	1	1	" " " " " " " " " "	"
St. Paul fr. McGill to St. Surpice	"	8 12"	1	1	" " " " " " " " " "	"

St. Antoine and Inspector	7	Put in new valve	Valve worn out
St. James and Cha-boilez	8	" " "	" "
St. Paul at C. H. Square	8	" " "	" "
St. Catherine and St. Constant	9	" " "	" "
Lagauchetière and Alexander	9	" " " piece	Old age
Wellington and Colborne	10	" " " valve	Valve worn out
St. Cath. bet. St. Law & St. Denis	10	Raised valve stone	To new level
Lagauchetière and Berri	11	Repair to hydran chamber	Old age
Visitation and Robin	12	Repair to valve frames	Paving
St. Sulpice and St. Paul	13	Put new iron frames	New level
Vitré and St. Denis	14	Raised valve covers	" "
St. Catherine and Dufresne	14	" " "	" "
St. Paul and St. Gabriel	15	" " "	" "
St. George and St. Catherine	16	" " "	" "
Inspector and St. Antoine	16	Recalked joint	Joint blown out
University opp. Wesleyan Coll	17	Put in new valve	Valve worn out
Lacroix and Champ de Mars	18	" " "	" "
Richmond near St. Catherine	19	" " "	" "
Balmoral and St. Catherine	19	Lowered valve stone	To new level
St. Luke and St. Mathew	20	Raised valve stone	" "
" "	21	" " "	" "
" Tower	22	" " "	" "
Harbour and St. Catherine	23	Put new iron frame	Paving
Frontenac	24	" " "	" "
Fulton and Ontario	25	" " "	" "
St. Denis	26	Lowered valve stone	" "
Elm av.	27	" " "	" "
Victoria Square	28	Recalked joint	Joint blown out
Guy opp. No. 512	29	" " "	" "
Sherbrooke and Berri	30	Put in new valve	Valve worn out
Notre-Dame and Visitation	31	" " " rod	Rod too short

No. 10.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1891.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
St. James and Tasignan.....	Sept. 25	.....	1	1	Put in new valve.....	Valve worn out.
Pine av. and Mance.....	" 25	.....	1	1	Recaulked joint.....	Joint blown out.
St. James near St. Felix.....	" 25	10"	.....	.....	Examining for leaks.....	Ground boggy.
McDougall's Foundry.....	" 26	.....	1	1	Recaulked joint.....	Joint blown out.
Sherbrooke and St. Denis.....	" 26	30"	.....	.....	Repaired valve chamber.....	Falling away.
" and Amherst.....	" 26	20"	.....	.....	Put drain to valve chamber.....	No drain.
St. Lawrence and Fortier.....	" 27	12"	.....	.....	Put in new piece.....	Settling of drain cut.
St. Elizabeth and St. Catherine.....	" 27	12"	.....	.....	Raised valve stone.....	New level.
Delorimier opp. R. Mill.....	" 28	12"	.....	.....	" ".....	"
" and Burnette.....	" 28	12"	.....	.....	" ".....	"
St. George and Devienne.....	" 29	4"	.....	.....	Rebuilt valve chamber.....	Falling in.
McGill Coll. Av. and Sherbr.....	" 29	6"	.....	.....	Raised valve stone.....	New lev. l.
Lafontaine and Delorimier.....	" 30	12"	.....	.....	" ".....	"
St. Hubert and Ontario.....	" 30	6"	.....	.....	" ".....	"
St. Catherine and Sussex.....	" 30	24"	.....	.....	Repaired valve chamber.....	Falling in.
Pine avenue and Park avenue.....	" 30	12"	.....	.....	Recaulked joint.....	Joint blown out.

19	1	Repacked valve	W	Joint blown out.
19 1/2	1	Recalked joint	W	New level.
20 6	1	Put in new valve	W	Settling of drain cut.
20	1	"	W	New level.
21	1	"	W	"
21 6	1	Recalked joint	W	"
22 1/2	1	Raised valve stone	W	"
22 3/4	1	Put in new piece	W	"
23 1	1	Raised valve stone	W	"
23 1/2	1	"	W	"
24 1/2	1	"	W	"
24 6	1	"	W	"
24 6 1/2	1	"	W	"
24 6 1/2	1	"	W	"

No. 10.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1891.

Locality	DATE	NUMBER	VALVE	HOW REPAIRED	Probable cause of injury
St. Felix and Albert	Nov 2	1	Hydrant	Exam. for supposed leak.	Surface water.
King opp. Brush's factory	Nov 2	1	Valve	Put in new piece.	Old age.
Juror and St. Radegonde	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Concord St	Nov 2	1	Valve	Repacked valve.	Packing valve.
Mignonne and St. Lawrence	Nov 2	1	Valve	Put in new valve.	Valve worn out.
St. Sulpice and Notre-Dame	Nov 2	1	Valve	Repacked valve.	Packing valve.
Chenneville and Lagauchetière	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Harbour opp. Logan	Nov 2	1	Valve	Repacked valve.	Packing valve.
Eleanor and William	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Smith and Murray	Nov 2	1	Valve	Repacked valve.	Packing valve.
St. Lawrence and Sherbrooke	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Dorchester and Delormier av	Nov 2	1	Valve	Repacked valve.	Packing valve.
Logan and Itherville	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Mackay and Dorchester	Nov 2	1	Valve	Repacked valve.	Packing valve.
Bishop and	Nov 2	1	Valve	Put in new valve.	Valve worn out.
St. Catherine opp. No. 5 FIVE BUILDING	Nov 2	1	Valve	Repacked valve.	Packing valve.
St. Felix and Albert	Nov 2	1	Valve	Exam. for supposed leak.	Surface water.
King opp. Brush's factory	Nov 2	1	Valve	Put in new piece.	Old age.
Juror and St. Radegonde	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Concord St	Nov 2	1	Valve	Repacked valve.	Packing valve.
Mignonne and St. Lawrence	Nov 2	1	Valve	Put in new valve.	Valve worn out.
St. Sulpice and Notre-Dame	Nov 2	1	Valve	Repacked valve.	Packing valve.
Chenneville and Lagauchetière	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Harbour opp. Logan	Nov 2	1	Valve	Repacked valve.	Packing valve.
Eleanor and William	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Smith and Murray	Nov 2	1	Valve	Repacked valve.	Packing valve.
St. Lawrence and Sherbrooke	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Dorchester and Delormier av	Nov 2	1	Valve	Repacked valve.	Packing valve.
Logan and Itherville	Nov 2	1	Valve	Put in new valve.	Valve worn out.
Mackay and Dorchester	Nov 2	1	Valve	Repacked valve.	Packing valve.
Bishop and	Nov 2	1	Valve	Put in new valve.	Valve worn out.
St. Catherine opp. No. 5 FIVE BUILDING	Nov 2	1	Valve	Repacked valve.	Packing valve.

**SCHEDULE No. 11—SHOWING THE DIFFERENT KINDS AND SIZES
OF METERS BELONGING TO THE CITY AND TO PRIVATE PARTIES.**

Kinds.	Sizes in inches.	Property of the city.				Property of private parties.				
		In the City.	Outside City.	At work shop.	Total.	In the City.	Outside City.	At work shop.	Total.	Grand total.
Gem	10	.....	.....	2	2	.....	.....	.....	.....	2
"	6	4	1	1	6	4	.....	.....	4	10
"	4	18	.....	5	23	5	.....	.....	5	28
"	3	68	.....	5	73	9	.....	.....	9	82
"	2	29	.....	3	32	6	.....	.....	6	38
"	1½	7	.....	3	10	4	.....	.....	4	14
Union	2	.....	.....	.....	.....	1	.....	.....	1	1
"	1	16	.....	.....	16	.....	.....	.....	.....	16
"	1	30	.....	.....	30	.....	.....	.....	.....	30
Rotary Union..	1	2	.....	.....	2	.....	.....	.....	.....	2
Crown	6	2	.....	.....	2	1	2	.....	3	5
"	4	18	1	.....	19	4	.....	.....	4	23
"	3	21	1	1	23	2	.....	.....	2	25
"	2	19	3	.....	22	3	.....	.....	3	25
"	1½	20	.....	2	22	2	.....	.....	2	24
"	1	38	.....	12	50	.....	.....	.....	.....	50
"	¾	34	.....	14	48	1	.....	.....	1	49
"	¾	98	.....	25	123	2	.....	.....	2	125
Empire	2	6	.....	.....	6	.....	.....	.....	.....	6
"	1	25	.....	5	30	1	.....	.....	1	31
"	¾	6	.....	.....	6	.....	.....	.....	.....	6
"	¾	70	.....	14	84	.....	.....	.....	.....	84
Worthington ..	4	.....	.....	.....	.....	1	.....	.....	1	1
"	3	1	.....	1	2	.....	.....	.....	.....	2
"	2	9	.....	1	10	5	.....	.....	5	15
"	1½	12	.....	1	13	1	.....	.....	1	14
"	1	35	1	12	48	.....	.....	.....	.....	48
"	¾	43	.....	19	62	2	.....	.....	2	64
Hersey	1	1	.....	2	3	.....	.....	.....	.....	3
"	¾	7	.....	3	10	.....	.....	.....	.....	10
		639	7	131	777	54	2	.....	56	833

1

[illegible]

No. 12.—*Brachia alpestris* var. *typus*, *Br.*—*Continued.*

NAME OF STRAIN.	Lengths in feet of each iron pipe.										No. of Valves.										Wrought-iron pipe.	Length of lead pipe in feet.	Brass coupling.	All-Brass.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	50"	24"	20"	16"	12"	10"	8"	6"	4"	3"	50"	24"	20"	16"	12"	10"	8"	6"	4"	3"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
<i>St. Louis Ward.—Cont.</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</

No. 12.—Schedule showing the Pipes &c.—Continued.

NAME OF STREET.	Length in feet of Cast Iron Pipes.										No. of Valves.										Wrought Iron Pipe.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass Cocks.	Air Cocks.				
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.										
St. J.-Bite W.—Cont.																														
Brought forward.																														
Amherst					274		3079	36	9	3898								1	1	7			6	3716	306	2	308			
St. Hubert					324			18		342					1					1			1	336	19		19			
Mitchison							132			132							1			2			3							
Panet							912	6		918							2							36	1		1			
Total					1095		4123	54	15	5290					1		8	1	1	11			10	6187	325	2	322			
Hochelagu Ward.																														
Rouville							72			72							1			1										
Gale							461			461							1			1										
Robillard							758	6		764							2			2										
Davidson							838			838							3			3				162	17		17			
Cuvilliers																								422	21	51	9			
Darling							482			482													16	202	7		7			
Ontario							612	4		616								1		1			1	175	11		11			
Notre Dame							16		14	30														105	13		13			
Dazéy																								164	18		18			
Frontenac							6			6													1	164	18		18			
Sewer							124		96	104													1	333	16		16			
St. Germain Lane							24			24													1	61	4		4			
Préfontaine							168			168														24	1		1			
Migonnie																														
Hayre							21		25	33													1	15	5		5			
Marlborough																														
St. Catherine																									271	16		16		
Total					612		2976	10	88	3681							7	1	2	10			22	3234	181	1	180			

MANUFACTURE												13
Centre	5	4	570	4	570	4	570	4	570	4	570	13
Knox	5	574	570	574	570	574	570	574	570	574	570	29
Narcelon Road	5	574	570	574	570	574	570	574	570	574	570	11
Wellington	5	574	570	574	570	574	570	574	570	574	570	2
Charron	189	563	568	563	568	563	568	563	568	563	568	4
Rushbrooke	5	563	568	563	568	563	568	563	568	563	568	20
Grand Trunk	519	510	520	519	510	520	519	510	520	519	510	3
Bourgeois	519	510	520	519	510	520	519	510	520	519	510	6
Pavard	519	510	520	519	510	520	519	510	520	519	510	25
Ropery	519	510	520	519	510	520	519	510	520	519	510	9
Atwater	300	49	401	300	49	401	300	49	401	300	49	7
Coleraine	300	144	144	300	144	144	300	144	144	300	144	20
Hibernia Road	300	144	144	300	144	144	300	144	144	300	144	4
Island	300	144	144	300	144	144	300	144	144	300	144	1
Macdalen	300	144	144	300	144	144	300	144	144	300	144	3
Mullin	300	144	144	300	144	144	300	144	144	300	144	19
Paris	300	144	144	300	144	144	300	144	144	300	144	10
Rosary	300	144	144	300	144	144	300	144	144	300	144	2
Byle	300	144	144	300	144	144	300	144	144	300	144	30
St. Charles	300	144	144	300	144	144	300	144	144	300	144	63
Dargenson	300	144	144	300	144	144	300	144	144	300	144	1
Liverpool	300	144	144	300	144	144	300	144	144	300	144	13
Knox Avenue	300	144	144	300	144	144	300	144	144	300	144	31
Ash Avenue	300	144	144	300	144	144	300	144	144	300	144	8
Charlevoix	300	144	144	300	144	144	300	144	144	300	144	21
Chateauguy	300	144	144	300	144	144	300	144	144	300	144	10
Pacific Lane	300	144	144	300	144	144	300	144	144	300	144	6
Total	112	300	10 3721	38	52	4233	5	7	2	14	4	404

RECAPITULATION.

No. 12.—Schedule showing the Pipes, Hydrants, Valves, Services, &c., laid in the City of Montreal during the year 1891.

WARDS.	Length in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipe.	Hydrants.	Length of lead pipes in feet.	Houses supplied.	Brass Cocks.	Air Cocks.	
	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total.							
East.....					778	5	463	2	28	1276					2	1	1	1	3	6	20 1/2"	7	85	9		9	
Centre.....	156	3							57	216									6		6			62	4	1	1
West.....							10	7	51	68										2			1	95	5		3
St. Ann.....	497				1692	2088	267	41	171	7067					5	3	10	1	9	29	38	30	21	2491	118	6	107
St. Antoine.....	11	1032	1797	2714	10196	1650	2331	543	539	21713		1	1	3	23	9	22	10	21	90	35	43	57	8106	386	47	339
St. Lawrence.....	1375				5995	1332	2788	145	181	11816		2			11	3	7	1	17	41			17	8961	378	26	348
St. Louis.....	36				2131	1624	2345	38	100	6274					3	6	13	2	4	28			27	2887	147	7	141
St. James.....	377		978		499	3265	5984	15	63	11181					3	6	9	1	5	24			32	4637	240	10	230
St. Mary.....					4069	3521	4103	94	313	12106					10	5	5	5	8	33			32	4580	292	19	271
St. Jean-Baptiste.....					1098		412	54	15	5200					1		8	1	1	11			10	6087	325	2	322
Hochelega.....					612		2976	10	83	3681									2	10			22	2234	131	1	130
St. Gabriel.....	112				300	10	3721	38	52	4233							7	1	2	10			4	8186	404		404
Total.....	500	3096	1806	3692	27570	13497	32322	987	1653	84915		3	1	5	63	33	89	20	74	296	73	73	236	47316	2439	119	2505

WARDS.	MAIN PIPES.														LEAD PIPES.	CHARGES.												Pub.	Priv.	TOTAL			
	30	24	20	16	12	10	8	6	4	3	1 1/2	TOTAL.	30	24		20	16	12	10	8	6	4	3	1 1/2	TOTAL								
East.....					2178	6896	776	2446	6349	713	80	18440					9	9	6	14	33	2		64	45	1	519						
Center.....					2374	3658	52	3503	6576	161	35	17772						4	4	8	4	18	31	7	74	31	4	637					
West.....					3078	7716	1052	5751	6996	685		27316						1	6	19	8	17	40	18	109	54		833					
St. Ann.....	1400		654															1	32	39	23	71	17	3	254	944	16	4107					
St. Antoine.....	1351	5492	3803	4660	62163	15036	7759	44043	103979	523	392	249021					4	7	4	6	36	16	95	61	70	1	307	144	7854				
St. Lawrence.....	2140	4016			17324	6827	4721	24013	22410			81462					1	3										179	150	4684			
St. Louis.....	1643	36			19264	12147	3174	23199	22705			83171					1		24	20	21	44	69					257	188	4283			
St. James.....	2855		4356	1074	13871	6615	9818	28274	36678			108545					1	2	1	4	22	79	87	252				185	107	6643			
St. Mary.....	2035	7664			100	17772	14599	5717	47213	32249	60	47744					1	4	1	35	34	14	113	86	1	276	212		79	84	1874		
St. Jean-Baptiste		3700			13944	366	7364	26961	15			51884							6	8	8	30	37	1	75	84			3620		1162		
Hochelaga.....					7415	7226	3925	13678	16640			10639							3	9	2	11	10	13	45	45							
St. Grégoire.....		112	2178		498		36	4907	7407	511																							
Total.....	10698	30702	8436	6744	171122	102326	54748	244762	314066	2096	507	946201		4	23	610	291	189	208	613	811	35	1	219	1718	38	42847						
Rising main.....												45506																					
Exhibition Gr'ds.												5484																					
Gr'd. Trk. R'y Pt																																	
St. Charles.....												9098																					
Grand Total.....	26890	65411	8435	6744	172796	102326	54748	232614	321391	2096	507	1006788		17	47	611	291	189	613	814	38	1	2236	1732	38	42850							

SCHEDULE No 14.—MAIN PIPES, HYDRANTS AND VALVES ABANDONNED IN 1891.

STREETS	WARDS.	MAIN PIPES.					VALVES.					Hydrants.	IN WHAT LOCALITY OF STREETS, PIPES WERE ABANDONNED.		
		12"	10"	8"	6"	4"	Total.	12"	10"	8"	6"			4"	Total.
Fripoune.	East		215				215							1	All of Fripoune.
Champ de Mars.	"					1300	1300				1	3	4	3	All of Champ-de-Mars.
St. Paul.	"													2	
St. Sulpice.	Center.	170					170				1		2	1	South of St. Paul.
St. Maurice.	"						600							1	From Chabot's St. to Dupré lane.
St. Ann.	"				200	1000	2100				2	2	4	1	From Wellington to Notre-Dame.
Collins.	"				60	410	460				1	1	2	2	" William to Notre-Dame.
Murray.	"				900	900	1800				1	2	3	4	" Chabot's Street to McGill.
College.	"					330	330				1	1	1	1	" Square to College.
Chabot's.	"					400	400				1	1	1	1	Above Wellington.
Shannon.	"													1	
Duke.	"													1	
St. Jean-Bte.	"					1400	1400				1	1	1	1	From Duluth Av. to Mount Royal Avenue.
St. Denis.	"													5	All of that part of Mignonne.
Mignonne.	St. Mary				2100	2000	2400				2	1	3	3	Fr. Mignonne to Ontario in '90 f. N.D. to Mign.
Parthons.	"					1650	1650					1	1	2	At Dufréne street.
Lafontaine.	"				145		145				2	3	5	3	From Dorchester to Sherbrooke.
Plessis.	"			60	70	3950	4080				2	3	5	4	" " below Sherbrooke.
Beaudry.	"				60	3400	3460				2	3	5	4	" " "
Visitation.	"													2	All in that ward.
Sherbrooke.	St. James.				1700		1700							2	" " "
Mignonne.	"					2140	2140							2	From St. Catherine to Sherbrooke.
St. André.	"					2320	2320				2		2	4	All of Rousseau street.
Rousseau.	"					300	300							1	From St. Catherine to Sherbrooke.
Jacques-Cartier.	"					2450	2450					3	3	1	" " "
Amherst.	"													1	At Sherbrooke street.
Maple.	"													1	" " "
Lagauchetière.	"													1	" " "
Sherbrooke.	St. Louis.													1	All in that ward.
St. Dominique.	"		1420			70	70					2	2	1	From Albina to Roy.
St. Hypolite.	"					45	45					1	1	1	From Albina to Ernest streets.
Cadieux.	"				40		40							2	All in that ward.
Sanguinet.	"				260	210	470							1	" " "
Laval.	"				180		180					1	1	1	From Albina to Ernest streets.
Prince Arthur.	"				775		775					1	1	2	All in that ward.
Dorchester.	"													1	" " "

St. Lawrence.	St. Louis.	680	1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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NO. 15 SCHEDULE SHOWING THE AVERAGE PRESSURE IN CITY MAINS DURING THE YEAR 1891.

MONTHS 1891.	FIRE STATIONS																	AVERAGE SURFACE OF WATER IN McTAVISH RESERVOIR.
	At W. W. shop Lagauchetière street cor. St. Chas. Bor.	Central Fire Station Craig street.	Fire Station No. 2 St. Gabriel st.	Fire Station No. 3 Wellington st.	Fire Station No. 4 Chaboulet Bgr.	Fire Station No. 5 St. Catherine St.	Fire Station No. 6 Ontario St.	Fire Station No. 7 Dalhousie Bgr.	Fire Station No. 8 Craig St.	Fire Station No. 9 Centre St.	Fire Station No. 10 St. Catherine St.	Fire Station No. 11 Ontario St.	Fire Station No. 12 Belgouars St.	Fire Station No. 13 Denery St.	Fire Station No. 14 St. J. Bre. Ward.	Fire Station No. 15 Island St. St. Gabriel Ward.	Average	
Height above datum.....	42.00	32.00	57.00	27.00	.....	97.	66.	70.50	43.	26.	1.30	70.	36.40	44.	.....	.....	205.00
January.....	65	72	67	79	79	45	65	58	71	83	30	66	77	73	113	79	204.32	
February.....	70	72	67	79	80	45	65	59	71	83	30	66	77	72	113	79	204.36	
March.....	70	72	68	79	80	45	65	59	71	83	31	67	77	73	113	79	204.03	
April.....	70	73	67	79	80	45	65	60	71	83	31	67	77	73	114	77	204.06	
May.....	75	73	67	79	80	45	65	61	71	83	30	67	78	74	114	77	203.01	
June.....	75	73	67	79	80	45	65	62	71	83	31	67	78	75	114	80	204.08	
July.....	75	73	67	79	80	45	65	61	71	83	30	67	78	75	114	81	203.61	
August.....	70	72	68	79	80	45	65	60	71	83	31	67	78	75	114	81	202.29	
September.....	70	73	67	79	78	46	65	59	71	83	31	67	78	75	113	81	203.89	
October.....	70	73	66	79	78	46	65	58	71	83	31	67	75	78	114	81	203.21	
November.....	70	73	67	79	80	46	65	57	71	83	31	68	77	75	113	80	204.09	
December.....	70	72	67	79	80	47	65	53	71	85	31	66	78	75	114	80	204.41	
Average 1891.....	68.5	72.5	67.	79.	79.6	45.4	65.	59.2	71.	83.2	30.6	66.7	77.3	74.8	113.5	79.6	203.78	
do 1890.....	65.90	72.00	69.	77.	78.	45.	65.	57.	70.	77.	30.	60.	74.	70.	111.	78.	203.03	

**SCHEDULE SHOWING THE POSITION OF PUBLIC FOUNTAINS ERECTED IN
THE CITY OF MONTREAL UP TO JANUARY 1892.**

LOCATION.	Cast Iron Basins.	Stone and Cement Bassin.	Stone Fountains.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Drinking Troughs	Number of Jets.
Ball Square.....				1			1
Park.....	1			1			2
and Dorchester.....			1				1
St. Urs Market.....							2
St. Louis Square.....						1	2
St. Louis Square.....				2			6
at Flour Shed.....				1		1	2
St. Louis Square.....	2	1	2				5
Victoria Square.....			1				2
opposite Drill Hall.....				1		1	1
House Square.....				1		1	1
er at Dominion Square.....				1		1	1
Square.....				1		1	1
near Notre Dame.....				1		1	1
t and St. Lawrence.....				1		1	1
Cartier Square and St. Paul... ..	1			1		1	5
at Hay Market.....						1	1
h street, opposite Réservoir.....				1			1
nd Common.....			1			1	2
st, at Waste Weir.....					1	1	2
oyal Avenue.....						1	1
me near Ruisseau Migeon.....						1	1
me and Suzanne.....				1		1	1
opposite Reformatory grounds..					1	1	2
nd Champlain.....						1	2
corner Dalhousie.....						1	2
1, north of Sherbrooke.....					1	1	2
1 Square.....		1			1	1	7
venue and St. Jean-Baptiste.....						1	2
Square.....				1			1
Square and St. Catherine.....						1	1
ames, remov. to W. Park Oct. 1891							
nd Common.....				1		1	2
nd Champlain.....				1		1	1
nd Square.....				1		1	1
s and William.....				1		1	1
ke, near Drummond.....		1				1	2
ke, corner Guy.....						1	1
Market.....					2		2
ine Market.....				1		1	2
rine and Western Park.. ..						1	2
rine and Delorimier.....					1	1	2
iel Market.....					1	1	2

No. 16.—SCHEDULE.—Continued.

No.	LOCATION. Distributed along the Wharves	Road Watering Nozzles.	Cast Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals.	Number of Jets.
1	Wind-Mill Point		6	1	1	1	3
2	Allan's Wharf		1			1	2
3	Allan's Sheds				1		2
4	Custom House (opposite)					1	2
5	King's Basin		1				1
6	Dominton Line				1	1	3
7	Jacques Cartier Square (foot of)		1				1
8	St. Gabriel street (foot of)	1					1
9	St. Helen's Island Ferry						1
10	Beaver Line			1	1	1	3
11	Donaldson Line, foot of Grant street ...					1	1
12	Commissioners, east of Barrack	1					1
13	Longueuil Ferry					1	2
14	Mariborough street (foot of)					1	2
15	Desery street (foot of)					1	2
12	Gale street (west of)					1	2

No.		6"	12"	10"	8"	6"	4"
		840	11,048	108	2,500	125	
No.		6"	12"	10"	8"	6"	4"
		269	87	120	21	207	
		5	4	8	13	3	
		22	42	48	53	37	3
		6	11	32	57	42	17
		21	31	36	54	164	138
			8	10	12	17	14
		15	3	19	9	17	28
			19	29	5	13	18
			5	6			
		12	19	83	45		
44	St. Louis Sq						
45	St. Patrick						
46	St. Patrick						
47	St. Patrick						
48	St. Thomas						
49	Victoria Sq						
50	Victoria Sq						
51	Viger Squa						
52	Viger Squa						
53	Viger Squa						
54	Viger Mar						
55	Wellington						
56	Wellington						
57	Western Pa						
58	St. Patrick						
59	Dalhousie						

No.		6x12	6x12	12x12	12x10	12x8	12x6	12x4
		2	5	34	11	32	2	
No.		6x3	6x3	6x3	4x4	4x3	3x2	
		11	5	17	1	7	7	2
No.		6x10	12x12	12x10	12x8	12x6	12x4	
		2	17	18	4	37	12	12
No.		6x3	6x3	6x3	6x4	4x4		
		2	4	13	5	10		
No.		6x3	6x3	6x3	10x6	8x6	8x4	6x4
		3	46	8	31	18	9	21

No.		6x3	6x3	4x2	4x2	
		16	15	15	10	13

SCHEDULE No. 17.—Continued.

BREECHES PIPES.

	30x30	30x24	30x20	12x12	10x10	8x8	6x6	
	2	1	1	1	2	8	7	
New hydrants (5 noz.).....	7							Street water nozels (brass). 593
Cast iron fender posts.....	11							" " " (iron) .. 3
Pieces for lengthening hydrant.....	6							Hydrant nozels 37
Assorted valve covers.....	134							Assorted spindles..... 59
Hydrants already used	7							Rods for stop-cocks assorted 78
1" pneumatic valves.....	8							2" iron pipe (in feet) 125
$\frac{3}{4}$" " "	12							$1\frac{1}{2}$" " " 23
$\frac{1}{2}$" " "	139							1" " "1792
2 way pneumatic valves....	22							17 Rolls 1" lead pipe, weight 3,009
3 " " "	26							58 " $\frac{5}{8}$" " " 8,700
4 " " "	17							474 " $\frac{1}{2}$" " " 73,470
$\frac{3}{4}$" " "	11							Lead (pig) in lbs. ....44,000
$\frac{1}{2}$" " "	18							Tin (ingot) in lbs..... 100
1" nozels	4							$\frac{3}{4}$" copper tubing in lbs..... 100
$\frac{1}{2}$" "	69							$\frac{1}{4}$" iron boxes assorted..... 38
1" x $\frac{5}{8}$ T's.....	58							Footpath plates complete....1394
$\frac{5}{8}$ Y's.....	3							Cast iron caps for tubs boxes 100
Assorted covers for boxes...	498							

..... repairing banks.....	42 26	
.....	94 84	
.....	6023 40	
.....	600 00	
..... salary.....	390 01	
.....	643 75	
.....	26 00	
.....	28 14	88

Vessel House.

.....	3650 00	
.....	216 23	
.....	257 49	
.....	313 19	
.....	67 93	
.....	761 33	
..... fire extinguisher.....	59 00	
.....	20 00	
.....	67 20	54

Store House.

.....	316 47	
.....	264 27	
..... boiler houses.....	139 86	
.....	3750 00	
.....	5085 51	
.....	10630 95	

MAILED STATEMENT OF EXPENDITURE, &c.—Continued.

	\$	c.	\$	c.
Brought forward.....			35803	94
TAIL RACE.				
ing tail race bridge	24121	34		
to banks.....	116	46		
fences.....	21	45		
furnish water to Ramsay estate	180	60	24439	85
PIPE TRACK.				
to valves.....	72	30		
.....	135	35	207	65
RESERVOIRS.				
n McTavish reservoir	400	00		
an High Level.....	593	60		
h, repairs	86	32		
ng snow.....	15	67		
.....	316	34		
.....	24	22		
ouse	20	60		
to buildings.....	9	90		
l light.....	240	27		
nd shanty	13	58		
; H. L. res. and pointing masonry.	96	58		
ne service	13	00		
.....	171	37	2001	45
ENGINE HOUSE HIGH LEVEL.				
n's salary.....	500	00		
.....	1391	78		
Engine.....	3188	56		
.....	299	54		
to buildings &c.....	127	28		
tools &c.	2	00		
nd telephone.....	34	93		
ng machinery and sundries.....	264	25	5808	34
Carried over.....			68261	23

DETAILED STATEMENT OF EXPENDITURE, &c.—*Continued.*

	\$	c.	\$
Brought forward.....			68 ⁶¹
WORK SHOP ON LAGAUCHETIÈRE STREET.			
Wages	14212	32	
Iron, spikos &c.....	409	38	
Rent of foreman's house	200	00	
Telephone service.....	123	74	
Fuel and light.....	860	73	
Fences	290	32	
Painting roofs.....	36	69	
Double windows.....	34	01	1616 ⁹ 1

DISTRIBUTION PIPES.

Repairs to mains, sewer and valves ; wages.	24061	80	
Thawing pipes and carting water.....	1235	14	
Inspecting service pipes inside houses.....	6171	50	
Dress for inspectors.....	499	65	
Repairs to footpaths and service boxes; wages	2852	38	
Material, iron castings, lead, tin &c.....	454	67	
do wood, planks, nails &c.....	332	95	
do briks, cement, sand, drain pipes &c	184	24	35792 33

METER DEPARTMENT.

Meter inspectors and car fare.....	2473	85	
Testing, placing and repairing.....	2066	94	
New meters.....	6052	74	
Repairs to building	8	71	10602 2

PUBLIC FOUNTAINS.

Repairing ; wages.....	1467	57	
do materials	116	56	
Painting.....	160	73	
New troughs and drinking fountains.....	122	98	
Removing Place d'Armes fountain to St. Catherine street	534	27	2402
Carried over.....			133227

DETAILED STATEMENT OF EXPENDITURE, &c.—Continued.

	\$	c.	\$	c.	\$	c.
Brought forward.....			133227	10		
HYDRANTS.						
pecting; wages.....	8085	37				
pairing; do and materials...	4214	84				
ewing; horses and laborers...	1010	71				
t of tap house in St. J. B. w'd	128	00				
l for do do do	56	63				
vehicles for boilers.....	720	00				
ting	145	20	14360	75		

MISCELLANEOUS.

tingencies for office.....	605	58				
er analysis.....	2855	34				
sekeep superintendent.	400	00				
do foreman	350	00				
ages	1534	72				
ool taxes and assessments.....	546	82	6492	46		

STAFF.

erintendent.....	3500	00				
stant superintendent.....	2000	00				
ountant.....	1200	00				
ughtsman.....	1000	00				
erk and secretary.....	900	00				
do and chief inspector.....	900	00				
do	624	00	10124	00	164704	31

UNFORSEEN.

istant to accountant.....			312	00		
Carried over.....			164,515	31		

DETAILED STATEMENT OF EXPENDITURE, &c.—*Continued.*

	\$	c.	\$	c.	\$	c.	\$	c.
Brought forward ..					164816	31		
LOANS.								
PIPE LAYING.								
Wages.....	138448	48						
Tin and lead.....	10612	36						
Lead pipes.....	11703	86						
Copper, brass works..	7218	24						
Timber.....	3101	24						
Brick, sand clay....	2398	36						
Drain pipes.....	866	31						
Special castings.....	41022	91						
Cement.....	542	74						
Iron.....	2483	99						
Tools, patterns.....	4377	32						
Packing.....	451	77						
Iron pipes.....	1140	66						
Cast iron pipes.....	120201	18						
Sundries.....	1756	34						
Rock excavation in St. J. Bte ward	290	50						
Carting pipes.....	5538	52						
Coal	1099	58						
Repairing streets.....	770	35						
Steam pump.....	156	00						
Culvert under G. T. r'y track	42	18	354222	89				
New boiler for H. L. engine					4517	09	358739	98 523256 29

SCHEDULE No. 19.

Dwellings, stores, shops, offices, warehouses, manufactories, hotels, &c.. in
the City of Montreal, for year 1891-92 with assessed water rates thereon.

DWELLINGS;

Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.
\$				\$				\$			
5 00	1678	1587	91		38695	37281	1414		41228	37721	1493
5 75	3616	3490	126	23 00	27	25	2	44 00	85	85	
6 50	5038	4860	170	23 75	225	216	9	44 75	5	5	
7 25	6450	6292	168	24 50	6	6		46 25	1	1	
8 00	4599	4468	131	25 25	545	536	9	47 75	123	118	5
8 75	3864	3745	123	26 00	5	5		51 50	66	65	1
9 50	1273	1228	45	26 75	239	235	14	55 25	85	83	2
10 25	2805	2702	103	27 50	10	9	1	56 75		1	
11 00	345	321	24	28 25	147	138	9	59 00	55	55	
11 75	2094	2009	85	29 00	179	175	4	62 75	60	60	
12 50	534	507	27	29 75	182	177	5	66 50	6	6	
13 25	1115	1064	51	30 50	2	2		70 25	24	24	
14 00	1274	1206	68	31 25	87	84	3	77 75	26	26	
14 75	657	624	33	32 75	357	350	7	85 25	7	7	
15 50	163	153	10	33 50				92 75	22	22	
16 25	684	662	22	34 25	81	79	2	100 25	4	4	
17 00	90	83	7	35 00	5	5		107 75	13	10	
17 75	743	693	50	35 75	30	29	1	115 25	2	2	
18 50	235	230	5	36 50	185	175	10	122 75	3	3	
19 25	357	328	29	37 25	19	19		130 25	1	1	
20 00	117	108	9	38 75	12	12		137 75	4	4	
20 75	378	366	12	40 25	185	182	3	152 75	1	1	
21 50	253	243	10	41 75	3	3		377 75	1	1	
22 25	329	314	15	43 25	2	2					
	38695	37281	1414		41228	39721	1493		41820	40319	1501

SCHEDULE No. 19.—Continued.

Horses.		Cows.		Stalls.		Urinals.		Water closets.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
	\$		\$		\$		\$		\$
7166	2 00	1102	1 00	374	1 00	809	1 00	856	2 00
				267	2 00	29	1 50	237	3 00
						53	3 00	10199	4 00
						19	15 00	13	15 00
7166		1102		641		910		11305	

SPECIAL RATES.

Bakeries.		Beer bottlers.		Fountains.		Steam engines.			Sundries.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse power	Total.	No.	Rate.
	\$		\$		\$					
2	3 00	7	3 00	10	3 00	3	1	11	11	5 00
14	5 00	4	5 00	2	4 00	13	1	13	19	6 00
2	6 00	1	6 00	21	5 00	.....	.....	.....	1	7 00
3	7 00	1	8 00	2	7 00	15	2	30	.....	8 00
3	8 00	3	10 00	1	9 00	.....	.....	.....	11	10 00
.....	9 00	1	12 00	4	10 00	6	3	18	2	15 00
14	10 00	1	15 00	1	11 00	10	4	40	1	17 00
4	12 00	1	17 00	1	12 00	.....	.....	.....	1	20 00
1	14 00	.....	.....	1	17 00	9	5	45	1	21 00
10	15 00	.....	.....	1	26 00	3	6	18	1	25 00
1	17 00	.....	.....	.....	.....	8	7	56	1	30 00
3	18 00	.....	.....	.....	.....	2	8	16	1	50 00
4	20 00	.....	.....	.....	.....	1	8½	8½	1	750 00
1	23 00	.....	.....	.....	.....	2	9	18		
1	25 00	.....	.....	.....	.....	3	10	30		
1	27 00	.....	.....	.....	.....	11	11	11		
3	30 00	.....	.....	.....	.....	1	12	12		
.....	.....	.....	.....	.....	.....	2	14	28		
.....	.....	.....	.....	.....	.....	2	15	30		
.....	.....	.....	.....	.....	.....	1	16	16		
.....	.....	.....	.....	.....	.....	6	20	120		
.....	.....	.....	.....	.....	.....	1	25	25		
.....	.....	.....	.....	.....	.....	1	30	30		
.....	.....	.....	.....	.....	.....	1	34	34		
.....	.....	.....	.....	.....	.....	1	50	50		
67		19		44		92		650	51	

ANALYSES
OF THE
WATER SUPPLY
OF THE
CITY OF MONTREAL.

NOTICE

As the reports on Water analysis, by Drs. Wyatt Johnston, R. F. Rottan and by Prof. C. A. Piſter are not yet ready to be sent to the printer and to be included in the publication of this report, notice is hereby given that the above reports will be printed in a few weeks in a separate pamphlet.

★M. N. Baker

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1892

PRINTED BY ORDER OF THE WATER COMMITTEE.



Montreal
EUSÈBE SENÉCAL & FILS, PRINTERS,
20, ST. VINCENT STREET

1893

M. N. Baker

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OF THE

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FOR THE

YEAR ENDING 31st DECEMBER 1892

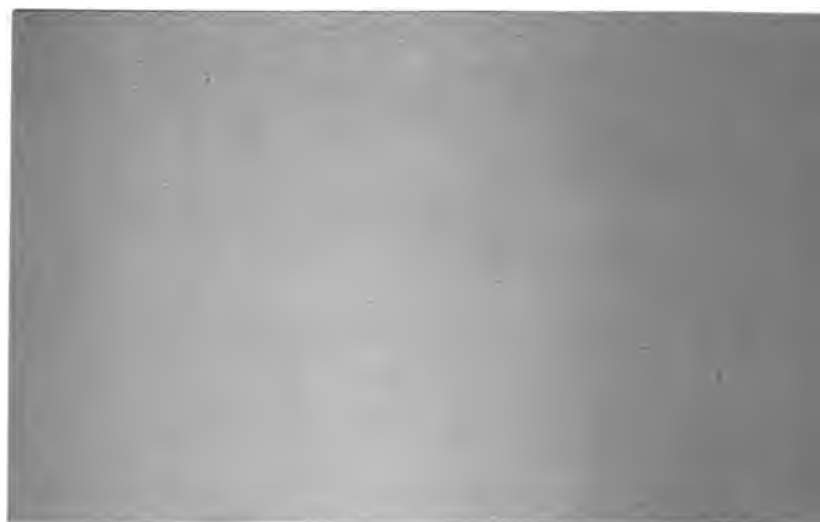
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11/6/93
"Notes"

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1893



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Montreal

EUSÈBE SENÉCAL & FILS, PRINTERS,

20, ST. VINCENT STREET.

1893

IV

both by water and steam, also the condition of all buildings, Reservoirs, etc., and the report of my inspection to the Committee is herein contained with all other reports made to the Water Committee, during the five months of my administration viz: from August 1st 1892 till December 31st 1892. It will be noticed that I have recommended a number of changes and improvements to be made, in order to place the Department in an adequate position to meet the emergencies and rapid daily increase in the consumption of water—the remodelling of the City both in its sanitary and commercial improvements, which is increasing its population so rapidly, that the Water Department have to set to work quickly in order to follow the other Departments who are progressing with their share of the improvements.

1. AQUEDUCT.

The retaining angle wall at the entrance of the Aqueduct needs very extensive repairs, I recommend the purchase of three acres of the water front from the opening of the Aqueduct west, so that it may be fenced in from the public highway, and that an additional angle wall be built out in the river to divert the water that sweeps the river shore from Lachine down, from passing into the Aqueduct and turn it passed the end of the present retaining wall down the river, a very extensive system of ditches to carry surface water away and to prevent the farms along the line of the Aqueduct from being damaged by water during heavy rainfall, particularly spring and fall. All the bridges crossing the Aqueduct require repairs, viz: 12, 13, 14, 15 should be renewed with iron girders at once, and all the others should also be replaced by iron girders, say two per annum after the first four have been renewed. The pier of the Stone Bridge now standing in the middle of the Aqueduct should be removed at once. An independent suction pipe from the Aqueduct to Wells of Pumping Engines should be connected from the outside of the settling pond, in order that the settling pond can be shut off for cleaning or repairs, or in the event of an accident to the banks as retaining wall to tail race. All shrubs, grass and trees should be cut away clean except a line of trees on the line of the fence. The riprap lining all along the aqueduct, should be thoroughly repaired.

2. LOW LEVEL PUMPING STATION WORKS.

No. 1. Turbine is in a fair condition of repair so that little expense was incurred on repairs of this Turbine and pumping connections.

No. 2. The old breast wheel was so seriously out of repair and being so old the iron framing is crystalysed to a dangerous extent

and the rim of wheel much cracked. The flume gates are useless. The retaining wall at the flume gates is so deteriorated that it was no longer safe to run the wheel, and after the report of the Chief Engineer Mr. Kearney, this wheel was stopped and condemned. I have made estimate to renew it by placing an improved turbine wheel with a double set of horizontal Worthington Pumps.

No. 3. Turbine wheel is in fair condition of repair, only the pumps are of the oldest type and require frequent repairs. It is not safe or economical to run and should be replaced by an improved first-class pump.

No. 4. Turbine wheel is likewise in fair order but of an old wasteful type and should be renewed by improved model. The wheel-house foundation and building are much in need of extensive repairs. The settling pond should be cleaned and cemented all over to facilitate the cleaning by a centre drain pipe to the Tail Race.

Steam Engine No. 1 worked well and has performed very heavy duty on account of the very early closing down of all the pumping turbines from the cause of extensive cold—the sudden increase of consumption of water—rendering the necessity of running both engines Nos. 1 and 3 night and day constantly. Very little repairs have been done to this engine. No. 3 Engine also worked well with very little repairs. But these engines, two in all are inadequate to meet with any break down or emergency of any serious nature. I have, as my predecessor has before me, recommended that an additional 10,000 000 gallon engine be purchased at once and erected on the foundation along side of the present No. 1, being of same type so as to keep a perfect uniformity of all the pumping machinery, seeing that we have in the two pumping engines the best reputed type in the market and have given a first-class result, in fact more quantity of water pumped per 24 hours than their guarantee. I have also recommended a new battery of three Heine's boilers to replace the oldest battery of old Lancashire boilers which are no longer economical to run as they are condemned to a low pressure of 40 lbs to the square inch on account of their age and worn out condition. The other boilers the battery of Heine's are first-class. The No. 2 Lancashire Battery will last for a few years longer when assisted by a new battery of Heine's. The Boiler House needs alterations and extensive repairs. The engine houses are in need of repairs also the coal shed needs repairs. A new drain pipe was put in from No. 3 Engine to draw away all the shut off valve pits to the tunnel of the No. 1 Engine drain. The grounds are in fair condition but they should be improved as to making them more ornamental. The employees' dwellings should be repaired and improved.

3. MACHINE SHOP AND BRASS FOUNDRY.

The machine shop should be removed to the point of land at back of dwellings and remodelled and made into proper work shops so that all the material required to be turned into machine work could be all done by our own men thus saving a considerable amount and keeping a regular staff of men profitably employed constantly, from which staff of men could be promoted to all positions in the Department.

The work turned out during the year from the present shop is as follows :

NEW WORK DONE IN MACHINE SHOP AT WHEEL HOUSE, 1892.

217	New 5 nozels hydrants.
1	" 3 " "
1	" 2 " "
1	5 nozels hydrant seat.
3	8 " hydrant seats.
7	hydrant top nuts and 6 washers.
48	" watering noz.
79	4 valves.
74	8 " "
43	10 " "
64	12 " "
1	stuffing box for 4" valve.
17	4" valve spindles.
15	6" " "
12	8" " "
15	10" " "
15	12" " "
1	30" " "
3	packing screws.
14	1" pneumatic stop cocks.
167	$\frac{5}{8}$ " " "
1659	$\frac{1}{2}$ " " "
372	$\frac{1}{2}$ " 2 way branches.
177	$\frac{1}{2}$ " 3 " "
70	$\frac{1}{2}$ " " "
5333	Union couplings. }
5939	Tube caps. }
5518	Pointed ends. }
3174	Round " }
3114	Square " }
500	Nipples for pneumatic stop cocks.
40	$\frac{1}{2}$ " x $\frac{5}{8}$ " reducing couplings.
75	$\frac{1}{2}$ " Nozels.

VII

- 2172 $\frac{5}{8}$ " Nozles.
- 131 1" "
- 150 1" couplings.
- 34 $\frac{5}{8}$ " "
- 125 $\frac{1}{2}$ " stops cocks, old kind.
- 87 $\frac{1}{2}$ " " " "
- 1 $1\frac{3}{8}$ " steel spindle for foot valve Eng No. 1.
- 1 Hydraulic press handle, for press house.
- 179 Brass wire springs. H. L. P. Station.
- 2 Rimmers.
- 1 Tap and 2 1" bolts.
- 2 $\frac{3}{4}$ " Eye bolts.
- 1 Steel washer for main pipe drill.

REPAIRS DONE TO.

- 11 Hydrants.
- 5 4" valve.
- 3 6" "
- 2 10" "
- 31 Fire irons.
- 1 Fan gear. H. L. P. Station.
- 1 Air pump bucket and discharge valve.
- 2 Foothpath augers.
- 92 Pick axes.
- 26,650 lbs of brass castings delivered from foundry during the year.

The report of Mr. Kearney Chief Engineer in charge of Low Level Station shows all details of works etc. The amount of water pumped during the year by steam and water is shown by schedule No. 5

4. TAIL RACE.

The bank has given away on west side and requires considerable repairs. A good deal of crib work will have to be made and filled with stone to prevent this back from filling in Tail Race in time so that these repairs should be done as quickly as possible.

5. PIPE TRACK AND MAIN.

The schedule shows that mains that have been laid and the intention is to connect the circuit on the high level mains passing through the principal streets of the high part of the city, and on which high pressure main will be connected to fire hydrants only except in the high level of the City, above the low level Reservoir

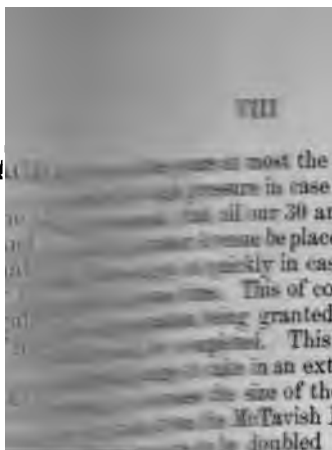
3. M

The mach
of dwellings
that all the
be all done
keeping a r
which staff
ment.

The work
follows :

New wo

217	Ne
1	"
1	"
1	5 no.
3	8 "
7	hw
48	
79	4
74	8
43	1
64	1
1	st
17	4" van
15	6"
12	8"
15	10"
15	12"
1	30"
3	packi
14	1" pu
167	5"
1659	1"
372	1" 2
177	1" 3
70	1"
5333	Union
5939	Tube
5518	Pointed
3174	Round
3114	Square
500	Nipples
40	1" x 1/2"
75	1" Noz



principal part of the City
of fire.

and 24 inch double rising
in a tunnel so that they
of accident the tunnel
This of course could be done gra-
for this purpose yearly
This tunnel should be con-
in an extra main of 40 inch as it
the size of the present ones in a few
McTavish Reservoir to High Level

all be improved as they are put
of repair the new ones shall be
expense of breaking the pipes
to remove them for repairs etc.

RESERVOIRS.

requires extensive repairs. The cross
pressure of ice and leaks at the rate
per hour. The top layer of stone coping
sectional crib work will have to be
part of the wall. The walls need repairs
the fence. The grounds require to be
of valves and valve house require
High Level Reservoir requires the
wire pannel fence is much needed
the public from throwing in all
of the water being polluted by
dead bodies and lowering them at
for two watchmen should be
that this reservoir would be
as well as by day.

LEVEL SERVICE.

much in need of repair. The large
work but needs repairs and some
engine is useless as it can only press
not to the upper reservoir. I
a duplicate engine the same as
a proper engine house be erected to
small engine can be sold to
are in good order only the smoke
they should be altered and improved.
should be erected as the present

IX

coal shed is too small and should be built so as to feed the coal to boilers, all with a direct view to economy, and to me the required emergency of both increase of consumption of water and in case of the break down of the large engine.

8. PIPE LAYING.

The total length of cast iron pipes laid during 1892 is 70,977 feet equal to 13.544 miles, the weight of metal being 3,012.51 tons. The different sizes of pipes laid, their lengths and weights, and the number of valves of different sizes put in are as follows :

Sizes.	Length in feet.	Weight in tons.	Number of valves.
30	.....	.....	1
24	2496	307.54	2
20	4575	430.87	4
16	2050	139.60	2
12	25401	1145.31	60
10	13994	435.26	38
8	20125	520.08	63
6	1183	21.04	15
4	1153	12.81	70
Total.....	70,977	3012.51	255

9. NEW HYDRANTS Etc.

New 5 nozels hydrants put in during 1892.....	143
“ 2 “ “ “ “ “ “ “	7
Total.....	150
Total 5 nozels hydrants in position up to January 1893.	584
“ 3 “ “ “ “ “ “ “	70
“ 2 “ “ “ “ “ “ “	537
Total hydrants (including old pattern)	1875
Private hydrants.....	49
Total.....	1924
Hydrants found frozen in 1892.....	2326

SERVICE PIPES TO HOUSES.

Brass cocks laid in 1892.....	539
Air cocks “ “	1801
Total services laid.....	2340

Length of lead pipe, in fact, for service laid in 1892. 45784

PIPES AND VALVES LAID UP TO JANUARY, 1893.

	Pipes.	Valves
30"	26,800	18
24"	60,907	49
20"	13,010	10
16"	8,794	13
12	198,197	353
10	116,326	227
8	84,873	271
6	253,697	630
4	322,554	884
3"	2,095	38
Total.	1,077,253	2493
Useless pipes left in ground..	30,056	Useless valves left in ground..... 37
Total to jan. 1893.	1,047,197 or 198.33 miles.	2456

**9. MAINTENANCE OF DISTRIBUTION AND SERVICE
PIPES, HYDRANTS AND PUBLIC FOUNTAINS.**

The report of foreman Legace together with schedule No. 9 gives full details of work under the above heading said reports and tables may be found in appendix.

The most serious break was that of the 30 inch main pipe on Centre and Atwater Avenue near low level station it having burst from the top and split open. The pattern for this class of pipe has been improved and strengthening strips have been added to the body of pipe to prevent a recurrence of such an accident.

10. CONSUMPTION OF WATER.

The quantity of water pumped during the year is 5,284,245,431 gallons or a daily average of 14,477,384 gallons an increase of 84,577, gallons daily over 1891. Average water pumped by water wheels per day 9,678,539 gallons average water pumped by steam pumping engine per day 4,798,566 gallons. No. 5a tableau shows all averages.

12. ADMINISTRATION.

Schedule 16 gives the details of the year's expenditure for main-

XI

tenance as well as for permanent improvements, the former amounts to \$155,250.85 the latter amounts to \$347,408.59 taken from loans and is principally for pipe laying.

13. GENERAL REMARKS.

The regulations in the administration of the department have been changed with a view to give a more efficient working of the offices and a clearer record of the registering of all the documents received both for the Water Committee and for the correct management of the department as the register for the finding of the Service Cocks was so incomplete that a very large number of these had to be dug out when water was to be shut off or turn on. It became necessary to renumber every service and find the direct location by a rule of measurement from corners of streets and from face of houses, this being all properly indicated on a sectional new map for that purpose along with location of all the shut off valves in existence. When this is complete the key book to all these services will be handed to the staff for their guidance thus saving much time in finding any valves or service cock particularly in winter when they are all covered by snow and ice. A full set of sectional maps will also be made showing the exact positions of all water pipes, size of same and valves thereto. The general map will then be completed for office use and guidance of the officers and Committee of the department.

I have the honor to be, Gentlemen,

Your obedient servant,

A. DAVIS,

Supt. M. W. W

XII

REPORTS OF THE SUPERINTENDENT OF M. W. W. TO THE WATER COMMITTEE.

To the

Chairman and Members of the Water Committee.

GENTLEMEN,

I beg to submit for your information, the following :

Immediately after my appointment, I started to make an inspection of the department, and to order an inventory of all the material, tools, etc., also to inspect all buildings, machinery, engines, water wheels, aqueduct, reservoirs etc.

Hochelaga office.—Starting at east end of City, I found at Hochelaga, in the market and fire station building, a telephone and two employees, one a turn cock and one man. Both are very little employed.

Shop, St. Jean-Baptiste Ward.—I found a little patched up shed, at St. Jean-Baptiste, kept fairly clean but altogether insufficient to keep valuable materials in, and to perform the necessary work required. It is much exposed to fire and not at all fit for what it is used for.

Shop, LaGauchetière street.—The main shop at corner St. Chas. Borommée, is neatly kept, such as it is, but such a large amount of valuable property in the way of material of all kind, should have proper buildings and yard room. This place is simply a nest of all kind, huddled up together, with all manners of patched up sheds, all of which are in a dangerous non-systematical principle. More ground should be purchased at once, before the vacant lot west of this property is sold to others. It should be secured and proper buildings erected to keep the property of the department in proper and methodical order, which would save the cost in one year. In the present condition no proper method or system can be established for economy and safety.

Shop, Point St. Charles.—I found the testing shed with toolshed and material yard at Point St. Charles, very much in the same condition. Here we have plenty of ground room, but all buildings are simply temporary sheds. The testing shed is badly fitted up, without system. A proper weighing scale should be erected on the ground, adjoining the testing press, to prevent the large amount of cartage to the weighing house, which is a distance of more than a mile away, thus expending a large amount for extra men and cartage.

ers are in fair order. The
done. I am preparing a
do the work satisfactorily.
the boilers, two in number,
efficient draught artificially,
The smoke boxes and smoke
small, and badly designed,
altered and remodelled to
and needs repairs and repaint-

st be made to make this engine
The boiler house is in a bad
rebricked, etc. The fence about
res repairs to prevent the pro-

All buildings are in a deplorable
instances, they are in danger of
the machine shop and boiler
s. 1 and 3 Worthington engines
ground that are in a fair state of
of system. The turbine that
wheel, that was removed, is of the
ult: it is in bad order and vibra-
which will cause a serious accident
pumps worked by number 2 turbine,
in bad order. The breast wheel is in
neer is frightened to run it, as it
could be stopped, it might burst
ing the aqueduct into the Tail Race,
ill. I recommend that this wheel
remodelling of the foundations and
ceive a new improved turbine and
ished, the old number one can be
corresponding one can be put in, not
to prevent accidents. When this is
d be used in summer, which will soon
ing, which must be done soon.

the necessary plans and estimates for
will consent to this. I find that a sad
ing the last Worthington pumping
ation should have been lowered 10 feet,
the power, as well as its wear and tear.
in place of running it into the cham-

ilar engine is very urgent, as I find. by
nters, steam pumping, that all the steam
use at once, this for weeks at a time,

XIV

hence an accident to one of these two engines would have left the City on a half supply, or possibly worse.

The boilers are in fair order, but of an old type, and very expensive on fuel. They also need improvement very much. The boiler house is badly constructed, and a wooden ceiling has been built close to the boilers, which I intend to remove as quickly as possible to prevent accident from fire, etc.

One of the cross bridges spanning the Tail Race at back of wheel house, caved in of its own weight. I had this repaired and improved in doing so. I found that all these cross sections must be removed, they are all in a dangerous state. Arches of stone or iron should have been made in the first place, but cedars were used as cross beams simply laid with 4 feet of earth on top. Three more arches will need repairs, if only of a temporary class, as the building will have to be widened in remodelling for new turbines.

The main drain running from No. 3 engine to Tail Race, became blocked, as it was too close to foundation of building, and in its course having to have a recess bend that would always become choked, leaving this important main shut off, valves submerged in water, so that this engine could not be started, under six or seven hours pumping, before this valve could be operated, and in winter exposed to be destroyed by ice. A new drain had to be made to connect with the main entrance valve, and run its course to lowest point in tunnel of No. 1 exhaust.

Much is needed in remodelling the shop and foundry at this place. I find that we are working both of these at a disadvantage and loss. First the building is wrongly situated, the foundry being at a long distance across the yard, apart from the main shop, is altogether wrong; all the work must be as closely concentrated as possible to work with advantage and with economy. The most of the castings are contracted for, and only a few things are made at a much higher rate in our foundry. We should do all our brass castings, or none at all. The machine shop also makes only a part of our need, this, like the foundry should be made more efficient to do all our repairs, except in very large special pieces; and we should do all this with a good result of both, saving and improving the service as well as creating a first class set of valuable men from the training we should give them. We should train boys that in time could fill any position.

Meters.—We have a meter testing apparatus that is very expensive, and we are obliged to pay largely for the repairs of meters. This meter testing and repairing should be all done at our main shop at the wheel house, thus first saving the large quantity of water used for testing, also the money paid for repairing, as the man who is employed to do this testing, should be able to do the repairs at the same time.

I found that we have no suction communicating at the back of

first flood gate. Should a break take place in retaining wall, we should be unable to give any supply for the aqueduct. This needs a large suction pipe put in across the settling pond to back of gates, to save the possibility of a disaster. I will make plans and estimates for this as soon as possible.

Aqueduct.—Visiting the whole of the aqueduct carefully, I find much of the rip-rap side lining is gone to the bottom, and in many places the banks washed away. A number of the wooden bridges are in bad order, two of them so bad as to require immediate attention to save damage.

A farmer named Dunn, has made a claim of \$200 for the damages caused to his farm from not having drained his farm. I have returned the claim to his solicitor, stating that we are in no ways concerned in the matter, as our ditches are made 12" lower than those on his farm.

I find we have one principal main stone culvert at the mouth of the old aqueduct caved in, in the centre of the canal. We shall have to repair this by constructing a coffer dam in the canal of old aqueduct. This will be costly before all the repairs are done.

I find that the crank pulleys to lift logs, on the principal flood gate, have been erected wrong, and are thus useless. They must all be re-erected to be of any use. I find the long cut wall and break water at entrance of aqueduct, in very bad order. In many places, the foundation timbers are running out, and the water is rushing now through the bottom of the cut wall, destroying by degrees. Also the whole of the coping planks are completely rotten away; this must be all renewed very soon, and a large amount of the bank clay filled into the cribs. I recommend that the City purchases the river front, the full length of our boom and a good fence be made. Also a cut wall of crib work to run out 60 feet to prevent the damages by wash, and to prevent the public from making use of the entrance of the water for any purposes, at this entrance.

Valves.—I find that all the valves, from the smallest to the largest have been made from the oldest type, and causing much useless expenses. When any valves have to be removed, the men have been in the habit of breaking the pipes next the valves, thus having to renew them in replacing valves. In future all valves shall be made with flanges, so that they can be put in and removed for repairs or otherwise, by simply disconnecting joints.

Large Mains.—In future all large connections will be made with the improved ribbed connections, which will prevent the possibility of bursting accidents at these points.

Orders and Office Work.—I had to reorganize this at once, as orders for material had been issued by a number of employees and no system really to record any work, or method for the conducting of affairs. Now all orders must be given only on one form, and

Nov. 3rd, 1892.

*the**Chairman and Members of the Water Committee.*

GENTLEMEN,

As it is absolutely necessary that we should look for an additional means of supplying the City with water over and above what we have now through the aqueduct, the increase of the City's consumption having run upwards of 4,000,000 gallons per day, necessitates the immediate serious consideration as to the best means to meet the demand in a practical manner.

I find by a number of reports that have been made from time to time by several outside engineers as well as the two late Superintendents of the department, the recommendation of increasing the capacity of the aqueduct by the two following systems : first, by widening the present aqueduct, or constructing a new one next to it. After studying the question carefully, I have come to the conclusion that I cannot recommend either of these plans from the fact that at the first, namely, the widening of the present aqueduct, is altogether impracticable, as the water that is now running through could not be disturbed, and rendered unfit for use during the operation, as there is no other supply to make use of.

As to a new and larger aqueduct to be constructed for the purpose of pumping the water from a numerous number of turbino wheels, I also consider like the last, impracticable, from the fact that it does not increase the head of water, it would only increase the volume whereby a more extensive water pumping power could be obtained during the open season only, but would not prevent the same necessity of depending on steam power during the winter season, which is caused both by high and low water. When the water is packed up in the tail race during the spring and fall to an incalculable height from the formation of the ice in the St. Lawrence, and from the breaking up of the same in the spring, also the lowering of the water in the aqueduct from extensive cold, such as we have this winter, and the extra formation of ice, likewise the formation of frazil that floats down in the aqueduct, would only be increased and create even a greater difficulty than at present, could either of the above system be carried out, as there is no known system to prevent this extraordinary formation which forms one of our serious difficulties with the water wheel system at this particular place, preventing all classes of water wheels from working. The facts being authentic from our practical experience of this winter, when on the 30th of January every turbine wheel had to be closed, or ceased working, caused by the water being so low in the aqueduct.

safety and health, and the cost is within the possibility of being carried out. We can establish a filtering system from our reservoir through our domestic service main, at a cost of about \$85,000 which will give a clean, healthy, domestic water, which becoming rapidly an absolute necessity that must be established sooner or later. I would also suggest that the amount necessary to carry out this system be granted as early as possible, and that this construction should be gone into gradually, so that we shall have the whole of our new system established within two years. This would allow ample time to reach the most improved machinery, likewise carrying out the whole of this undertaking in the most advantageous and economical manner.

The above respectfully submitted

A. DAVIS,

Superintendent of M. W. W.

Nov. 3rd, 1892.

To the

Chairman and Members of the Water Committee.

GENTLEMEN.

I have been preparing for the last few weeks the means of emptying the aqueduct, in order that I might make thorough examination of the old breast wheel, and the flume gate thereto. Likewise the flume gates leading the water to the other three turbine wheels. Also the openings to the leaders for the suction of the other two steam pumps.

1. I beg to call your attention to the fact that in accordance with my first report regarding the old breast wheel and the breast wall, I found that it had been impossible to close the flume gates, from the fact that they were so badly rotted away, and the frames on which they are hinged and the facings of the same, are so distorted and wasted away, also being loose in their fastenings, that had we succeeded in closing them at any time during an emergency the whole fabric would likely have been carried away into the Tail Race. Consequently I have been obliged to lock the said gates with extra inner frames and facings with back bracing, in order that we may remove the old breast wheel, without interfering with the Settling Pond, and prepare the remodelling of the foundation to receive a new turbine wheel with pumps thereto, on the most improved system. This will result in a saving of at least 2000/0 over and above the result of the ancient appliances.

When this is completed, it will be necessary to remodel the other two old turbines, as they are only wasting a very large volume of the water, and their construction being anything but proper. In case of accidents great difficulties would be experienced in removing any of the broken parts, as they have been built in the wall frame plates, piece by piece, and in the removing of the same, the whole fabric would be demolished before any of the parts in connection with the pumps could be taken out. This is a serious matter to which I trust you will give me your support in carrying out the immediate remodelling of this machinery.

I also beg to call your attention to the fact that the bottom of the Settling Pond is altogether unfit for the use it is calculated for, as there are no means of cleaning it. Hence, all the sediments are simply accumulated, until it will soon be level with the gates, and into the tunnels of our pumps.

I beg to suggest that you will allow me to make preparation for laying a new stone bottom properly cemented, with a centre escape pipe that could be opened from time to time, in order that the sediments may be washed out through the said pipe into the Tail Race, without interfering with the working of our machinery.

In order to do this, it will be necessary to construct a lock gate at the first bridge of the aqueduct, and build a leading canal around the present Settling Pond to the two pumping engines, so that we may during the remodelling, pump the water direct from the aqueduct.

I consider this matter very urgent, and I earnestly beg that the Committee will insist on getting the necessary amount granted by the Council, for the carrying out this work immediately.

I do not intend that this should be considered a part of my general report, which I propose making in January, as I find it will be necessary to revise a great many things in connection with the whole system of our department, when the appropriation for the the general outlay of the coming year, will be asked for.

In the meantime I desire to be authorised to remove the Breast Wheel and make preparations for the new turbines, at the earliest possible date.

The whole respectfully submitted,

A. DAVIS,

Superintendent of M. W. W.

CITY HALL }
Montreal, Nov. 3rd 1892. }

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REPORT of the Assistant-Superintendent of Water Works, on meters and house service inspection, for the year 1892.

A. DAVIS, Esq.

Supt. M. W. W.

DEAR SIR,

I beg to submit my report on the operations of the meter and house service inspection branches of the water department for the year 1892.

METERS.

The number of meters in use at the end of the year was 739 including those at wheel-house. This is an addition of 37 to the number in use in 1891.

The city owns 678 of those in use and the other 61 belong to private individuals of business firms.

There were 90 new places metered and 72 meters that had been in use were discontinued.

There were 115 changes of meters made for various reasons, some being out of order, others too small, etc.

There were 12 meters damaged by frost. In these cases the damages were charged to the tenant, according to by-law, section 2 R. No. 82 holds them responsible for all damages to the instruments on their premises.

The department purchased during the year the following meters:

12 CROWN :	{	2	—	4 inches
		1	—	3 "
		4	—	2 "
		5	—	$\frac{1}{2}$ "
10 EMPIRE :	{	4	—	2 "
		6	—	1 "

There were also 4 crown meters purchased by private parties.

4 CROWN :	{	1	—	6 inches.
		1	—	4
		1	—	3
		1	—	2

proportion for new meters was
 e over run, so that the persons
 themselves.

as the department has a better
 and the rent charged is enough
 cost and provide a fund for
 out. Besides which the expen-
 le of purchasing has a tendency
 commencing the use of meters,
 be the policy of the department,
 table than by the rental system.

at the harbour latrines have been
 ive no revenue this being ordered

meters at the Low Level pumping
 r used at the steps of the turbines

and the previous year was distributed

	1892 Millions of Gallons.	1891 Millions of Gallons.
.....	179.75	160.18
use at lly and hotels.....	175.86	168.97
street ry.....	68.84	101.45
.....	28.67	26.05
.....	6.77	7.04
.....	36.25	37.72
.....	6.69	6.96
.....	28.59	26.59
livery stables, skating tc.).....	31.85	18.07
.....	109.48	44.72
Totals.....	672.75	597.75

se of 12½ per hundred in 1892 over 1891.

to 1892 :

REPORT of the Assistant-Superintendent of
Works, on meters and house service
year 1892.

A. DAVIS, Esq.

Sept. M. W. W.

DEAR SIR,

I beg to submit my report on the
house service inspection branches
the year 1892.

MBW

The number of meters in use
including those at wheel-house,
number in use in 1891.

The city owns 678 of those
private individuals of business

There were 90 new places in
in use were discontinued.

There were 115 changes of
some being out of order, other

There were 12 meters damaged
damages were charged to the
2 R. No. 82 holds them responsible
on their premises.

The department purchased

12 CROWN : { 2
1
4
5

10 EMPIRE :

There were also 4

4 CROWN :

Total.

347

368

312

297

305

331

370

426

468

508

544

589

616

670

693

702

739

to the year 1876,

meter.

different kinds and sizes

same parties.

as follows :

1,000 gallons per day or

30 cents per 1,000 gallo

from 1,000 to 2,000 gallons

gallons.

\$0.28

0.27

0.25

0.23

0.21

0.19

0.17

0.15

10,000 gallons per day.

INSPECTION.

From January first to Novem

were discharged and the

It was the discovery and stoppage of
 leaks as enumerated below, viz :

	1892.	Galls. per hour.		1891.	Galls. per hour.
5009	wasting	63616	4180	wasting	53227
81	"	1220	61	"	1148
4523	"	88797	3334	"	67606
76	"	1161	68	"	1045
159	"	3295	189	"	4623
332	"	4329	382	"	4607
508	"	11387	373	"	8252
18	"	100	20	"	307
822	"	14991	676	"	12872
11528	"	188896	9283		153687

of 1892 over 1891 is 23 %, but considering the
 factors employed in this inspection this year with
 and a diminution of 10 % on the number of galls. of

the following irregularities were also found :—

to prevent freezing.....	4	wasting	150	gallons p. minute
flush drains.....	8	"	190	" "
used illegally for building purposes				29
hose illegally				85

There were 601 sounds heard on service pipes.
 As the reports were made to the shop and repaired by
 the department if the leak was in the street.
 The case of illegal use of water was arrested as soon as disco-

The number of prosecutions in the Recorder's court was 135
 and the revenue from them was :—

Fines.....	\$ 50.00
Costs.....	201.25
	<hr/>
	\$251.25

The inspection cost our department this year \$8,285.94.
 In finishing this report I want to call your attention to the
 following figures.

Expenses for inspection.....	\$8,285.94
and fines etc., (only).....	251.25
say 30% of the expenses.....	

I think we should either be more severe and consequently make prosecutions or raise the fines so as to cover a greater part of our expenses.

Out of 135 prosecutions we had this year before the Recorder's Court:

102	were charged only with costs	
3	" fined.....	\$5.00
8	" "	3.00
3	" "	2.00
5	" "	1.00
2	" settled privately.....	
6	" withdrawn.....	
6	sentence suspended.....	

135

At section 25, reg. 65 we see that one infraction to our rules could be punished by a fine not exceeding \$20.00 and costs besides or two months imprisonment.

The consequence of this raising of fines will not be only the increase of revenue but the principal object will be to force people to take better care of all pipes connected with their buildings and diminish the enormous quantity of water wasted. The loss of water by negligence amount to about 30 % of the whole consumption, *in winter*.

COMPARISON OF METER RATES WITH RATES BASED ON ASSESSED RENTAL.

The total quantity of water pumped in 1892 was Gallons.
That bringing no direct revenue was :

Flooding private rinks, etc.....	1,623,287
Fires.....	11,952,000
Watering streets	85,281,824
Public fountains.....	47,606,400
Harbour (approximately).....	14,000,000
Steps of turbines.....	17,934,439

Total.....

178,397,954

Balance producing revenue.....

4,897,211,7

That charged for at meter rates :

Factories and engines.....	179,754,227
Elevators.....	175,861,281
Railways.....	68,840,957
Schools, convents, etc.....	28,667,239
Hospitals and homes.....	6,769,798
Hotels.....	36,249,011
Church organs.....	6,691,661
Breweries.....	28,591,899
Miscellaneous, etc.....	31,852,401
Outside city limits.....	109,477,079

Total.....	672,755,553
------------	-------------

Balance being that charged for at rates based on rental, special rates and including waste.....	4,224,456,190
---	---------------

The revenue from water in 1892 was :

That from metered water, including
rent of meters\$132,508.50
being at the averaged rate of $19\frac{3}{4}$ cts.
per 1,000 gallons pumped.

That from rates based on rental and
special charges\$528,860.69
being at the rate of $12\frac{1}{2}$ cents per
1,000 gallons pumped.

Total water from which revenue is derived.....	4,897,211,743
---	---------------

Total revenue from assessed rate.....	\$661,369.19
---------------------------------------	--------------

being at the rate of $13\frac{1}{2}$ cents per
1,000 gallons pumped.

Total water pumped	5,075,609,693
--------------------------	---------------

“ revenue.....\$661,369.19
being at the rate of $13\frac{1}{2}$ cents per
1,000 gallons pumped.

The monthly inspection and reading of all meters in use has been
kept up as usual.

Your obedient servant,

J. O. A. LAFOREST,

CIVIL ENGINEER.

Ass. Supt. M. W. IV.

Ass. Supt's OFFICE, }
1st May 1893. }

Low LEVEL PUMPING STATIONS.

Jan. 4th 1893.

A. DAVIS, Esq.

Superintendent Water Works.

DEAR SIR,

My report for the year ending the 31st December 1892 is respectfully presented.

No. 1 WHEEL HOUSE.

The repairs recommended in my last year's report were not carried out. The wooden sheeting of which the inside walls are composed, requires to have portions of it renewed, also sections of the whole flooring should be renewed. Portions of the skirting facing of the gallery are very much decayed, and should be renewed. The whole interior of the building should be painted, also the outside of the doors and windows. The stone lintel over the north door is cracked, I would recommend its being removed and replaced with a wooden one. The stone coping on the east side of the building is frost sprung, and some of the stones are broken, they should be put in their former good condition. The coil pipes for heating the building frequently give out, they should be renewed. The frost trapping in the wheel pit will require some repairs, and the roof should be painted.

Nos. 2, 3 & 4 WHEEL HOUSES.

The repairs recommended to this building were not carried out. A section or the whole of the flooring requires renewing. All the windows and frames with the exception of the large one on the west side should be renewed, the sashes and frames of the existing ones, will not admit of their being handled without breaking the glass. The porches require to be renewed, and the whole interior requires painting.

The stone foundation of this building is very leaky, letting the water from the wheel and tail race into the main tunnel and pump room to such an extent that it makes the filling up and pointing of the joints in the masonry an annual repair, as said filling and pointing is carried away in the spring when the ice is leaving. The rain and thaw water is making its way through the roof in several places, which should be remedied. The steam coil pipes like those of No. 1 Turbine House, are 18 years in use, and they should be renewed.

THE MACHINE SHOP.

The floor of this building is very much worn, and it should certainly be renewed, also the stairs likewise. The large window frame and double window on the south end, should be renewed.

Nothing has been done to the extension before reported on, and appropriated for.

No. 1 ENGINE HOUSE.

You kindly had some slight repairs done to the building, in the shape of patching the ceiling and other parts, also an inclosure around the wash-stand which has a neat appearance.

The whole interior of the building, office and work room should be painted and varnished. The oil cloth on the floor is very much worn and presents an unclean appearance. A portion of the sheet iron was blown off the roof, it was repaired. The man who repaired it reported the whole iron of the roof very much pitted, which is evidently correct as the water is making its way in, in several places, the sheet iron should be renewed, and also that of the work room attached. Some of the basement flooring will have to be renewed. You kindly furnished a number of oil drip pans, which have been found very serviceable. Series of cupboards should be built all round the work room, and oil room for the keeping out of sight, the various stores and other requirements.

No. 3 ENGINE HOUSE.

This building requires painting. The stone steps at the front door should be repaired and all the outside wood work painted. That portion of the chimney of this building above the roof should be taken down, it being in an unsightly dilapidated condition, it serves no purpose and could be dispensed with. The roof should also be painted.

THE BOILER HOUSES.

The boiler houses proper are in as good repair as buildings of their kind can reasonably be expected to be notwithstanding that the brick work in many places is sprung and separated, which has been the case for years, the repairing of which would require a very general pulling down. The outside wood work requires painting. The base of the chimney should be better protected from the water falling off the roof, a number of the bricks being *scaled*, which *scaled* bricks should be removed and replaced. The concrete covering of the smoke flue, in the rear of the boilers leading to the chimney outside of the building is very much broken up it should be recovered and a surface drain laid of the most permanent kind to conduct the surface water which unavoidably falls from the roof

of the boiler houses, on the covering of this flue. This is very important and should be attended to as early as possible in the spring, as the surface water is finding its way in under the Cornish boilers. That portion of the wooden tramway covering, attached to the front of the boiler houses, should be thoroughly repaired or renewed.

THE COAL SHED.

This building is very much in need of painting. The roof is leaking in several places and it should be repaired or recovered. The brick work of the north end is considerably frost sprung, the top of the wall being about five inches out of plumb, and the stone retaining buttresses on the inside are in a tumble down condition. That section of the stone foundation on the east side should be pointed, and some other minor repairs. The Weigh House attached is also in a similar condition.

THE DWELLINGS.

These buildings are in a wretched condition externally for want of painting, and their internal condition is not much better. Two of the occupants are asking for new kitchen floors, and some repairs to the plastering. The premises are in a very unsanitary condition, and the sheds in the rear require considerable repairs. The service and waste pipes are about 27 years old and as consequence are constantly giving out. The plumbers repairing them say they are worn out.

THE BRASS FOUNDRY.

This building is in fairly good order. The cast iron chimney cap was blown off by the wind and broken, it should be replaced. There requires to be removed from within this building, a large accumulation that is no longer serviceable, being duplicate parts of the Breast Wheel that will not be required. The interior should be whitewashed.

THE GROUNDS.

The work recommended in my last year's report was carried out, which consisted of the sodding of that portion of the slope between the Engine and Wheel Houses, and the placing of a new wooden stairs leading to No. 1 Engine House. A caving occurred on the road immediately in front of Nos. 2, 3 & 4 Wheel Houses, the timbers covering the Wheel race having given way. It was repaired by recovering the space with new timbers. Nos. 1 & 2 wheel race coverings were examined. No. 2 being found unsafe, the same was reported to you by letter, this covering should be removed as quickly as possible. The railing around the Tail Race immediately in front of the wheel house requires painting, also the railings in front of

the dwellings. The complete blocking of No. 3 Engine 30" stop valve pit drain, made necessary the cutting off of the old drain and the laying of a new one in a manner that will give uninterrupted drainage, the drain being laid from the aforesaid pit to No. 1 Engine 30" valve pit, which connects with the lowest point of discharge where there is, and will be pumps constantly at work to remove the drainage water.

I particularly desire to bring under your notice, the large accumulation of ashes and other residues peculiar to our works, which is deposited in the yard during the winter and which presents a very unsightly appearance in the spring, and early part of the summer, and has elicited unfavorable comments from Engineers and others visiting the works. This unsightly heap could be effectually overcome, by building an iron shed immediately in front of the boiler houses, of sufficient capacity wherein the residues could be deposited during the winter, and removed at pleasure. This would admit of the grounds in this part of the yard, being put and kept in keeping with the rest, having well defined roads and grass plots.

No. 1 TURBINE WHEEL.

This wheel has worked well during the year, the repairs being slight, consisting of the removing of one of the pump valves and seat, the adjusting of the connecting rod and guide brasses. The remaking of the pump valve chest joints, and other minor repairs. The east end journal of the large bevelled wheel counter shaft, has always given and still gives trouble, it being found difficult to keep it from heating, which can only be done at the expense of large quantities of oil, which in my opinion is in some measure due to the lurch that has existed in these shafts ever since the wheel started. Present indications are that this wheel is good for another year's work without costly repairs. It should be painted.

No. 2 WHEEL.

A crack made its appearance in the rim of this wheel, of such a nature as in my opinion warranted me in stopping it, and reporting to you that I thought it unsafe to run it any longer, in which opinion you concurred. The head race entrance is effectually trapped off from the settling basin, also the tail race from the wheel pit. When the work of erecting the proposed wheels is being proceeded with, it will be probably necessary to employ a steam pump, to keep the wheel pit dry, as water is making its way through many of the joints of the foundations in the wheel pit.

No 3 WHEEL.

The pump and other parts attached to this wheel, are as old as

the same worn out condition.
repairs may be looked for at

FUEL.

During the year, requiring but slight
sometime a perceptible leak by
I would recommend when condition
on pumps be constructed with
to the present gearing exactly
umps. This would be an improve-

ENGINE.

cost of the refitting of one of the
remaking of all the other pistons.
the remaking of several of the
carried, 110 lbs. most of the joint
Where such high steam is carried
which would effectually remove
pained off. The magnitude of the
implications, makes sharp attention
large bolt was renewed, to get, at
it being found necessary to make
the outside of the valve chest
with the new.
duplicate set of pistons and piston
desirable to have them on hand.
is in good order and working
and portions of the lagging

ENGINE.

very slight consisting of the
properly securing in position
worked loosely. The
examining and setting out of
of the drain pipes and other
of several broken stud
valves readjusted and piston
with a new stuffing

WATER BOILERS.

During the year, no repairs being
necessary and then keeping a

working boilers, several of the steam pipe joints, had to be remade and a section of the feed pipe, in front of the boilers was renewed. You had the fronts and pipes painted, which they very much needed. They are at present in good order. The usual fire bricks and clay will be required, and probably a new set of grate bars.

No. 2 BATTERY OF BOILERS.

One of the boilers of this battery is being, and will be required, to be used with No 3 battery, furnishing steam to No 3 engine, when running up to maximum speed. A new set of grate bars will be necessary and the usual fire bricks will be required.

No. 3 BATTERY OF BOILERS.

These boilers are in good order, and present indications are that they may be reasonably looked upon, as being good for another year's service without costly repairs. They were furnished with a new set of grate bars. All the boilers were tested by the City Boiler Inspector, and pronounced all right.

THE PORTABLE STEAM PUMP AND BOILER.

The boiler was thoroughly repaired by John McDougall after which it was tested by Mr E. O. Champagne, the City Boiler Inspector, who has not officially advised me of the limit of steam allowed by himself to be carried on the boilers, in fact, I have never been furnished with certificates of the tests made on the boilers under my charge. If they are not furnished to your office, they are not furnished at all. They should be.

I would especially wish to bring under your notice the very early period at which we are obliged to commence continuous day and night pumping by steam owing to the unprecedentedly low water in the Aqueduct, which will necessarily cause a larger consumption of coal than was anticipated to carry us through the winter, unless some favorable condition arise, which is not apparant at present.

The following are the dates at which we commenced continuous day and night pumping, for the last four years, and the date at which we commenced this year.

1889.....	February 23rd
1890.....	March 22nd
1891.....	February 7th
1892.....	February 13th
and again 1892.....	December 21st

Another consideration is that the engine having to perform such long and heavy duty, will, when the winter pumping is over,

those of the engine, in order that the condition
They may be ascertained, and in engines of
any time much work and considerable time.

This work will require the use of the engines will be required
repairs. The hydraulic machinery in keeping up
the valve gear will be required to be in atten-
tion, leaving the other half to do the
will require some outside assistance,
will permit of use as soon as possible.
attaching to the engine you my thanks for the able assis-
fitting in the discharge of my duty.
ment was submitted

The repairs to the honor to be,
low pressure
and valve
joints. One
require for
the joints
the trouble
engine will
necessarily
which entails
special
remove the
I hope for
rods, for the
At the time
well. Your
renewed.

The repairs
adjusting of
some of the
hauling of
piston rings
slight repairs
The boiler for
and rings re-
box gland.

This battery
found necessa-

D. KEARNEY

Engine

HIGH LEVEL PUMPING STATION, McTavish Street.

January 1893.

DAVIS, Esq.

Superintendent, M. W. W.

City Hall, Montreal.

g to submit my annual report for the year ending 31st Dec'r on the work done, conditions and requirements of McTavish High Level Reservoirs, and High Level Pumping Station.

THE WORTHINGTON ENGINE.

the same condition as last year and requires some light s. It worked but one day during the past year. The condition has increased so much that this engine cannot force water : than the level of Pine Avenue. The steam pipes of this : require covering ; sectional asbestos is preferable.

THE GILBERT ENGINE.

s engine is working every day, has worked well throughout ar and gave no trouble other than the breaking of a stem- in the air pump bucket, and displacing of another in a hot the boiler plate frame that carries the friction pulleys for as got worn out. All these reparations were made at the shop Low Level pumping works. I put in two valves in the air pump t which I had on hand. I renewed 17 rubber valves and 40 wire springs in pumps during the year, the joints on steam burnt out occasionally and had to be remade. A set of wooden s is required for fastening tubes in heater connected on the nser, the present bushing is giving out. I would recommend ckman's patent fan for furnace blast instead of the present t would relieve the engine considerably. The engine and s require to be painted, the steam pipes to be covered with s and painted, the wooden casing on cylinders to be sanded and varnished.

THE BOILERS.

Gilbert boiler is in good working condition, it worked in with the White boiler during the year. The water heater

connected with this boiler is worn out for over a year, and is much against the working of the boiler, as the water feed enters at a very low temperature, it requires to be renewed as soon as possible. The boiler requires to be covered anew as the present covering is burnt and falling off. This boiler required no repairs for the past year other than the making of steam joints on the superheater. We had the bottom flue covered with cast iron plates, as the flags used heretofore cracked with the heat. It would be recommendable to have the smoke box enlarged and the sheet iron flue to be renewed, a straight one connecting with the chimney would be preferable. I would also recommend a blow off pipe from safety valve of the boiler, up through the roof of building.

THE "WHITE'S" BOILER.

This boiler worked in turn with the Gilbert during the year and required no work done or repairs other than the remaking of joints on steam pipes and super heater. It would be recommendable to enlarge the smoke box or combustion chamber as the boiler seems choked in the draught, also to change the top sheet iron flue to a straight one and do away with the bends connecting with the chimney; a blow off pipe from safety valve of this boiler is also required.

THE OLD ENGINE HOUSE.

Requires painting and oak graining, a new floor, as the present one is decayed and a new oil cloth for same. The water course around outside of this building is all broken by the frost and a new one is required. I would recommend wooden blocks.

THE NEW ENGINE ROOM.

This room requires to be newly painted, walls, ceiling and floor. It requires six iron girders to lay across beams for lifting purposes, 18 feet long and strong enough to lift a ton weight in the centre; the place is much in need of a store room to keep supplies.

THE BOILER HOUSE.

This building requires a new floor of flagging or rock cement. The back wall must be repaired right away as the snow, water and surface water is coming through thus injuring the wall and roof. One of the rafters is decaying from this water and must be supported by a new upright iron post.

The inside of this room requires whitewashing and a few other repairs

THE CHIMNEY.

A conical shaped, sheet iron lining, is necessary for this chimney, from centre of the height to the top, as the present built is not

ioned with boilers and we are compelled to use a force
 the time. There has been a new cast iron door put in base
 they for cleaning accommodations.

THE COAL SHED.

roof of this shed is leaking and requires to be caulked with
 and pitched, tared and covered with 3 inch timber.
 back wall to be repaired as the surface water is coming
 hit.

THE McTAVISH RESERVOIR.

supply from this reservoir was continually on the city
 the past year. The whole portion of centre wall wants to
 aired, it leaks so badly from side to side, that a reserve
 be kept in either. The masonry in back wall requires grout-
 pointing with cement, also to be puddled with clay back of
 considerable surface water is getting into the reservoir.
 are several of the coping stones of the old portion of the
 air crumbling away and require to be replaced. The retain-
 ills are all tight. The revetment requires a new covering of 1½
 boards of which it will take about 400, and about 75 three inch
 the same to be coated with tar. The wooden fencing around
 air property requires straightening and painting. The banks
 ope were kept in good order during the past summer, the
 cleaned out and grass cut regularly. It would be an important
 ement to make a macadamized road on reservoir bank from
 ce on north side to coal shed, as the coal carts keep the bank
 and hard to keep in order. The electric light on the bank is of
 advantage, and if the light department would place one on
 on road at north side of reservoir it would be a great benefit
 as well as to the public as this corner is in total darkness.

THE VALVE HOUSE.

walls require pointing on the outside; the roof, doors, win-
 ceiling and cornices to be painted. The floodgates in overflow
 e are decayed and wants renewing. A new water float and
 are required, also some iron braces to stay valve rods in well;
 re temporarily fixed with wooden ones.

HIGH LEVEL RESERVOIR.

reservoir was kept continually full for the past year on its
 1, except half a day (11th June) while renewing a service
 o the Allan property during which time the old engine
 d on the section. There is a slight leak showing from

the reservoir at foot of slope. The back and end walls require pointing as surface water is getting into reservoir. The valve house wants a new floor and frame, the present one is decayed. It would be recommendable to have a telephone placed here by which we would get water gauge, &c., thus saving a lot of time. A low water gauge placed here would be a benefit in case a main broke, the alarm would be sounded in Engine house or dwelling. A small boat is required for this reservoir.

THE DWELLING.

The dwelling requires some sanitary improvements. The extension of the engine room water closet to the top of building and the water closet of dwelling placed therein, would allow the pipes to be removed from one of the principal rooms of the house which they at present pass through and causes a dangerous and disagreeable smell. There was \$150 appropriated for this last spring but nothing was done. The steam heating pipes are leaking and requires renewing. All the windows in and outside, and blinds require painting as they have not been done for years. Also the cornices and wood work to be painted.

TELEPHONES.

The private telephone owing to the defect in instrument, or some other reason, has given very poor satisfaction during the year. The other instrument worked very well.

THE SCALE.

The timbers of the scale are all decayed and broken. A new scale must be put in before we can weigh any more coal. Also a new scale house is required the present one is decayed and tumbling down. A new cover over scale will be required to be built.

It would be recommendable to concrete the bottoms of the reservoirs as they are at present very rough and expensive to clean and wash out. It would also save a lot of time, as at present it takes about a week to clean them which is a very long time to keep them empty.

The whole respectfully submitted,

I have the honour to be,

Sir,

Your obedient servant,

JAMES COLEMAN.

WATER WORKS SHOP.

March, 1893.

A. DAVIS, Esq.

Superintendent Water Works.

DEAR SIR,

I respectfully submit the report of the work in detail done under my supervision during the year ending December 31st 1892.

PIPE LAYING.

The new 30" pipe on Atwater Avenue was connected to the old 30" pipe at St. Antoine Street.

St. Sulpice Street pipe, 24", was extended to Commissioners, and through Commissioners Street to Berri and up Berri to St. Francis Street.

Part of the 24" pipe which had to be removed in Ontario Street Subway was relaid as far as the west side of the bridge, leaving a gap of about 300 feet to be laid this year.

A 20" pipe was laid from Sherbrooke Street 30", through Park Ave. to Pine Ave., and through Pine Av. to St. Denis St.

A 16" main was laid on Cadieux Street from Prince Arthur Street to Duluth Avenue, connecting with the 20" of Pine Avenue.

12" PIPES.

12" pipes were laid in the following streets :

Mount Royal Avenue, from Cadieux Street to Park Avenue.

University street, from Pine Avenue to Prince Arthur Street.

Prince Arthur Street, from University Street to Cadieux Street.

Cadieux Street, from Prince Arthur Street to Rachel Street.

Sherbrooke Street from McTavish Street to University Street.

All these 12" pipes are fed from the High Level Reservoirs.

A double line of 12" pipes was laid across the Lachine Canal, west of Black's Bridge, connecting Common Street 12" pipe, to McGill Street 10" main.

These last pipes and the following are fed from the Low Level :

Congregation Street, from Wellington to Leber Street.

Common Street, from near McGill to Dalhousie Street.

St. Catherine Street, from Harbour Street to East Limit.

Ontario Street, from Cuvilier Street to East Limit.

Dalhousie Street, from William Street to Common Street.

Shearer Street, from St. Patrick Street to Grand Trunk Street.

Mignonne Street, from half way East of Iberville Street, to west side Iberville Street.

Beaudry Street, from Craig Street to Notre Dame Street.
Inspector Street, from 150 feet south of St James to Lagauchetière Street.

Milton Street, from St. Lawrence Street to St. Urbain Street.
Pine Avenue, from East of Park Avenue to Durocher Street.
Lagauchetière Street, across St. Hubert.
Lagauchetière Street, across Jacques-Cartier Street.

10" MAINS.

10" Mains were laid in the following Streets :

Papineau Avenue, from St. Catherine 12" to Sherbrooke 30"

Montcalm Street, from Ontario Street to Sherbrooke Street.

Atwater Avenue, from South of Dorchester St. to St. Catherine Street.

College Street, connecting to McGill 12" main.

St. Maurice Street, from McGill Street to Dupré Lane.

Grey Nun Street, from William to Common Street.

Durocher Street, from Sherbrooke Street to Pine Avenue.

Aqueduct Street, from St. Antoine to North of Overdale Avenue.

Argyle Avenue, from Aqueduct Street to 200 feet west of Mount St. Mary Avenue.

Riverside Street, from Mill Street to Conway Street.

Richmond Street, from south of St. James Street to south of Richmond Square.

Prefontaine Street, from St. Catherine to Ontario Street, 24" main.

Prefontaine Street, from Notre Dame Street 10" main to 15 feet north of Notre-Dame Street.

Prince Street, from Common to north of Brennan Street.

Pipes of smaller dimensions were laid in many streets.

Schedule No. 12 shows all the details in pipelaying.

A 30" valve should be put on the 30" main pipe, half way between Papineau Avenue and St. Denis Street, also on the same pipe, half way between McGill College Avenue and Moffats Hill, or Atwater Avenue south of Dorchester Street.

Two of the 24" valves at either side of the Lachine Canal should be altered so that they could be shut from the surface, or the chambers drained to William Street sewer.

Both the 24" and 20" valves at Guy and St. James Street, should be altered as the wells stand full of water and cannot be drained.

A 24" pipe should be laid on St. Denis Street, before the permanent paving is laid, from Sherbrooke Street to Pine Avenue 20" main. This may have some day to be extended to the North river. The experience at large fires shows the necessity of large mains to maintain the pressure.

MAIN REPAIRS, Etc.

The 30" valve cor. Sherbrooke and St. Famille Sta. was altered and can now be worked from the street surface.

One 30" breeches pipe broke near St. Peter River on Atwater Avenue by concussion whilst the 30" pipes were shut to make new connection on St. Antoine Street.

The old broken 30" valve cor. Sherbrooke St. and McGill College Avenue was taken out and replaced by a new one.

A 30" valve spindle was broken near the wheel house and was replaced by a new one.

The Bleury Street 24" main broke by the settling of the excavation and the cause was poor metal, there was no damage done by this break. The 20" main broke on Park Avenue by the same cause; and the 16" main on Cadieux Street also broke from bad metal.

The breaks on main pipes were as follows :

1	30"	Breeches pipe.			
1	24"	Pipe.			
2	12"	"			
3	10"	"			
8	8"	"			
7	6"	"			
21	4"	"			
3	24"	Joints were blown out.			
1	20"	"	"	"	"
12	12"	"	"	"	"
19	10"	"	"	"	"
8	8"	"	"	"	"
14	6"	"	"	"	"
29	4"	"	"	"	"
1	3"	"	"	"	"
1	30"	Valve was renewed.			
3	8"	"	"	"	"
4	6"	"	"	"	"
14	4"	"	"	"	"
1	30"	Valve spindle was renewed.			
1	12"	"	"	"	"
3	10"	"	"	"	"
1	8"	"	"	"	"
10	6"	"	"	"	"
11	4"	"	"	"	"

A new 12" drain had to be laid from one of the 30" valve chambers at the Wheel House. Some new extensions had to be made on the exhibition grounds and two men were in attendance during the exhibition time last fall. The 4" pipe on St. Urbain

Beaudry Street, from Craig Street to Notre-Dame Street and connected to
Inspector Street, from 150 feet south of Notre-Dame Street taken up from
tière Street.

Milton Street, from St. Lawrence Street
Pine Avenue, from East of Park Avenue to Erc.
Lagauchetière Street, across St. Hubert
Lagauchetière Street, across Jacques-Cartier Street

10" MAINS. The main pipes laid
in old mains.

10" Mains were laid in the following places: valves were renewed,
Papineau Avenue, from St. Lawrence Street. In former reports I
Montcalm Street, from Ontario Street.
Atwater Avenue, from South Street were employed until
Street. The cost was two thousand

College Street, connecting
St. Maurice Street, from St. Lawrence Street
Grey Nun Street, from West
Durocher Street, from Sheppard Street
Aqueduct Street, from St. Lawrence Street
Argyle Avenue, from Argyle Street
St. Mary Avenue.

Riverside Street, from St. Lawrence Street
Richmond Street, from
Richmond Square.

Prefontaine Street, from St. Lawrence Street
main.

Prefontaine Street, from Notre-Dame Street
north of Notre-Dame Street.

Prince Street, from Common
Pipes of smaller dimension
Schedule No. 12 shows all

A 30" valve should be laid
between Papineau Avenue and
pipe, half way between Montcalm
or Atwater Avenue south of

Two of the 24" valves at
be altered so that they
chambers drained to Willoughby

Both the 24" and 20" valves
be altered as the wells stop

A 24" pipe should be laid
when paving is laid, from
main. This may have saved
The experience at large
maintain the pressure

over drains, one hundred
pipes were broken in
ground cocks were renewed,
replaced by iron ones,
were renewed where

replaced by pneumatic stop
seven tubes were changed

inside private property and
were investigated. Five
and the cause could not

was four thousand and
defective tubes, settling of
pavement, also the settling
repairs.

should be lowered below

to Beaudry St.
Prefontaine St.
Logan St.
Logan St.
Logan St.

in the name of all the employees
under my supervision for the valuable
service you treated us all.

Sincerely,

Obedient servant,

CHAS. LAGACÉ,

Foreman.

No. 1.—SCHEDULE SHOWING THE WORK OF TURBINE No. 1.

MONTHS.	Time of pumping	Revolutions.	Gallons pumped.	Average pressure in air vessel.	Is Pounds.				
					Castor oil.	Tallow.	Coal oil.	Cotton waste.	Coal for heating.
1892	Hrs. M.								
January	714.00	596,993	139,099,369	77	139.50	.....	155.00	27.75	74,870
February	341.15	249,521	58,138,393	76	63.00	.....	102.00	12.00	71,960
March	674.15	551,933	128,600,389	77	191.25	.....	62.00	.....	76,520
April	744.00	612,622	149,730,926	77	219.00	.....	116.00	24.68	60,270
May	711.00	640,758	149,296,614	76	270.00	.....	124.00	27.43	19,540
June	744.00	671,818	156,533,594	75	279.00	.....	124.00	25.31	.....
July	744.00	645,640	150,294,320	75	238.50	.....	133.00	23.87	.....
August	744.00	616,612	143,670,596	77	182.25	.....	145.00	24.00	.....
September	710.20	600,667	139,955,411	76	202.50	.....	155.00	22.00	22,230
October	720.00	525,448	122,429,384	77	180.00	.....	150.00	22.62	76,210
November	613.20	566,163	131,915,979	78	200.25	.....	155.00	22.56	93,340
December	701.55								
Total	7448.05	6,307,575	1,469,664,975	76	2,225.25	120.00	1,541.00	259.85	494,940
Last year	7942.15	6,459,036	1,504,955,388	76	1,512.00	161.00	1,613.00	311.63	454,530

NO. 2.—SCHEDULE SHOWING THE WORK OF THE BREAST WHEEL NO. 2 AND TURBINES NOS. 3 AND 4.

MONTHS	TIME OF PUMPING.				REVOLUTIONS.			Gallons pumped.	IN POUNDS.		
	Breast wheel.		Turbine		Breast wheel.	Turbine	Turbine		Castor oil.	Coal oil.	Cotton waste.
	No. 2.	No. 3.	No. 4.	Hrs. M.								No. 2.	No. 3.	No. 4.
1892.	Hrs. M.	Hrs. M.	Hrs. M.								
January.....	48.00	337.05	635.50		24,105	249,488	803,126	111,010,600	119.25	111	28.00
February.....	.....	13.20	172.30		.....	9 366	170,971	16,089,674	27.00	74	13.37
March.....	.....	.....	724.55		.....	.....	884,836	76,439,896	94.50	96	.....
April.....	621.45	640.30	695.45		491,995	506,025	965,159	230,796,634	245.25	118	23.37
May.....	739.25	744.00	741.00		603,041	602,798	1,005,077	264,900,794	279.00	120	29.50
June.....	712.45	710.00	720.00		586,600	595,866	1,004,766	261,414,841	270.00	120	27.25
July.....	690.00	741.00	741.00		561,321	613,525	1,026,491	262,147,691	275.50	124	27.63
August.....	408.00	725.20	744.00		322,153	625,331	1,081,287	233,262,714	254.25	132	22.21
September.....	.....	710.00	706.50		.....	583,342	980,193	170,631,214	200.25	145	25.00
October.....	.....	717.55	719.40		.....	578,972	875,046	153,546,112	202.50	155	25.00
November.....	.....	702.55	708.40		.....	539,322	891,785	156,513,166	200.25	150	24.25
December.....	.....	525.30	643.30		.....	389,099	774,786	124,218,341	108.50	140	20.00
Total.....	3,119.55	6,557.35	7,956.40		2,599,515	5,243,131	10,458,113	2,063,843,200	2,336.25	1,519	262.62
Last year.....	5,246.55	6,638.50	2,49.05		4,113,414	5,005,694	9,515,501	2,177,793,662	2,366.25	1,635	318.23

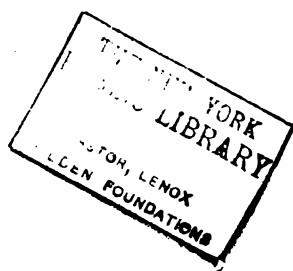
No. 3.—SCHEDULE SHOWING THE WORK OF STEAM ENGINE No. 1.

MONTHS.	Pumping time.		Revolutions.	Gallons pumped.	COAL USED IN POUNDS.			Av. pressure in air vessel.	IN POUNDS.								
	Hrs. M.				For pumping.	For banking.	To raise 1,000,000 gallons.		Cylinder grease.	Valvoline.	Seal oil.	Castor oil.	Cylinder oil.	Coal oil.	Cotton waste.		
1892.																	
January...	276.30	235,052	129,278,600	425,350	52,820	3,698	75	79.87	56.25	192	11.	22.18					
February...	553.05	487,587	268,172,850	848,070	21,580	3,242	73	79.87	63.00	192	192	31.00					
March.....	740.00	594,094	326,751,700	1,068,590		3,270	72	79.87	67.50	224	24	26.00					
April..	86.00	58,927	32,409,850	105,770	1,760	3,317	71	8.14	6.12	24	24	11.00					
May.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June.....	87.05	68,786	37,832,300	134,750	19,250	4,070	75	14	24.75	32	24	12.43					
July.....	208.05	151,211	83,166,050	280,740	33,870	3,783	77	28	42.75	.....	40	10.00				
August.....	320.40	266,246	124,435,300	414,200	38,240	3,635	75	42	63.00	24	4	15.00					
September.	265.30	216,584	119,121,200	345,590	35,320	3,533	75	21	56.25	64	48	19.00					
October.....	36.25	27,998	15,398,900	52,510	10,670	4,102	75	15.25	8.87	11.25	24	19.50					
November...	144.10	116,745	64,209,750	203,480	20,850	3,524	75	52.50	17.75	27.00	32	15.31					
December..	8.00	6,309	3,469,950	11,110	20,150	9,008	.....	.....	.....	2.25	.....	.....			
Total.....	2,725.30	2,229,539	1,204,246,450	3,932,160	254,510	3,476	75	67.75	336.49	420.12	792	181.42					
Average....	2,954.25	2,469,831	1,358,407,050	4,500,620	391,160	3,692	75	.....	404.49	570.00	1,880	176.07				
Last year...																	
Average...																	

MONTHS.	Pumping		Revolutions.	Gallons pumped	For pumping.	For banking fires.	To raise 1,000,000 gallons.	A.V. press. on pump.	In Pounds.						
	Hrs.	M.							Castor oil.	Cylinder oil.	Seal oil.	Coal oil.	Cotton waste	Cylinder Gre	Valvoline.
1892.															
January.....	82.15	.....	58,539	25,523,004	126,610	19,580	5,806	75	18.00	56	8.87	24	8.00	.....	.....
February.....	60.00	.....	41,062	17,903,032	99,700	9,960	6,125	75	11.25	32	.....	.....	15.00	.....	.....
March.....	78.45	.....	54,370	23,705,320	115,880	15,420	5,538	75	11.24	48	17.75	24	8.00	.....	.....
April.....	98.30	.....	66,041	28,793,876	145,800	17,410	5,668	75	9.00	63	8.87	16	8.00	.....	.....
May.....	54.30	.....	35,909	15,656,324	94,860	10,650	6,739	75	6.75	16	.....	16	8.00	7	.....
June.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August.....	76.10	.....	52,661	22,960,196	118,710	15,592	5,549	75	6.75	24	8.87	16	10.00	14	.....
September ..	402.00	.....	315,326	137,482,136	653,690	52,650	5,137	75	36.00	64	53.25	120	23.00	.....	105.00
October.....	262.00	.....	208,697	90,991,892	464,210	32,770	5,461	75	20.40	.....	35.80	88	35.40	.....	105.00
November. ...	519.30	.....	422,740	184,314,610	1,020,150	37,160	5,736	75	45.00	.....	71.00	176	25.50	.....	172.50
December....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1633.40	.....	1,255,345	547,330,420	2,841,610	211,192	5,600	75	164.40	303	204.41	480	140.90	21	382.50
Last year..	660.30	.....	486,737	212,218,640	1,081,660	102,490	5,579	75	110.25	512	61.11	192	60.75	.....	.....

No. 5.—SCHEDULE SHOWING TOTAL PUMPING AT LOW LEVEL STATION.

MONTHS	BY WATER POWER.				BY STEAM POWER.			TOTAL FOR EACH MONTH.			Percent- age.		Av. level of water.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 3.	By water. By steam.	By water. By steam.	By water. By steam.	By water. By steam.	By water. By steam.	Head of Aqueduct	In front of wheels.
January.....	130909360	5047546	30924224	60048336	129278600	.....	250139960	129278600	379418560	65 92 34	08 37	95 36	00
February.....	58128393	.....	1386108	14703506	268172850	25523004	74228067	293903854	867923921	20 30 79	50 36	75 35	97
March.....	.....	.....	.....	76431896	326751700	17903032	76439896	344654732	421664628	18 15 81	85 36	60 35	60
April.....	128660389	72812280	74891700	83089674	324098500	23705320	361397021	56110170	417512191	86 55 13	45 38	75 36	20
May.....	149730926	89256068	89214104	86436622	.....	28793876	414631720	28793876	443425596	93 50 6	50 38	49 36	21
June.....	149296614	86816800	88188168	86409876	37832300	16656324	410711458	73488624	464900082	88 47 11	53 39	05 36	84
July.....	156533594	85075508	90801700	88270486	83166050	.....	418681288	83166050	561549338	83 41 16	59 36	31 38	05
August.....	150244320	47723044	92548988	92996482	124435300	.....	385567034	124435300	507992334	75 50 24	50 36	49 36	55
September...	143670596	.....	86334610	84296598	119151200	22960196	314301510	142081396	456383206	68 87 31	13 37	89 36	00
October.....	13986441	.....	78287856	76258246	15398900	137482136	296501023	169881036	446382057	65 75 34	25 37	65 36	06
November.....	12242384	.....	79819656	76693510	64209750	90991892	278942560	162901642	434144192	81 29 18	71 37	90 36	54
December.....	131912979	67586652	66631596	3409050	184314646	256134227	18778450	443818817	57 70 42	30 37	08 36	29



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TUTOR FOUNDATIONS

No. 6.—SCHEDULE SHOWING THE WORK OF ENGINE No. 2. (THE GILBERT) AT HIGH LEVEL PUMPING STATION.)

29

MONTHS. 1892.	Pumping time.		Revolu- tions.	Gallons pumped.	Av. pressure in air vessel	COAL USED IN POUNDS.				Cylinder oil.	Cotton waste.
	Hrs. M.	For pumping.				For banking fires.	To raise 1,000,000 gallons.	For heating.			
									IN POUNDS.		
January	160.30	342701	10503397	108	64597	12400	4665	3175	122.50	20	
February	153.00	338012	16275614	108	62055	11600	4325	2683	92.00	25	
March	163.00	356249	17153744	104	72900	12690	4984	3823	89.00	20	
April	159.00	356847	17186536	108	69988	12470	4793	.....	91.00	25	
May	213.00	501986	24171126	109	101060	18200	5058	.....	128.00	25	
June	179.15	433487	20872876	110	73642	12400	4122	.....	105.00	20	
July	208.30	501990	24171320	110	91866	14000	4388	.....	106.00	20	
August	201.00	489817	23585180	110	90147	13000	4373	.....	104.00	20	
September	189.30	438956	21136171	110	81910	15000	4595	.....	105.00	20	
October	205.00	466612	22467835	110	91670	12400	4631	.....	102.00	20	
November	188.30	426247	20524221	110	87118	12200	4916	.....	92.50	22	
December	119.30	459853	22142379	110	87974	12600	4539	.....	96.25	20	
Total	2139.45	5,112,757	246,190,399	109	879,477	158,800	4,217	9,681	1234.25	257	
Last year	1842.35	4,238,089	203,958,225	103	684,707	153,800	4,110	4,597	1499.00	325	

**No. 7—SCHEDULE SHOWING THE AVERAGE DEPTH OF WATER,
THE RAIN FALL AND TEMPERATURE AT 9. A. M. AT
McTAVISH STREET RESERVOIR.**

MONTHS. 1892.	Average monthly depth of water in reservoir. Feet.	RAIN GAUGES, IN INCHES.				Average temperature at 9 A. M.
		Rain.	Snow.	Snow reduced to rain.	Total rain.	
January	22.67	0.74	32.00	2.96	3.70	17
February	22.17	.....	33.00	3.49	3.49	19
March	22.21	.....	19.75	2.08	2.08	19
April	21.58	1.02	2.25	0.23	1.25	38
May	21.83	1.61	.....	.....	1.64	49
June.....	21.56	5.44	.....	.....	5.44	66
July	20.94	2.20	.....	.....	2.20	67
August	22.12	4.61	.....	.....	4.61	66
September.....	22.27	2.91	.....	.....	2.91	59
October.....	22.28	1.53	.....	.....	1.53	31
November	22.18	0.88	17.75	1.61	2.51	31
December.....	.....	0.27	8.75	1.02	1.29	18
Total.....	21.98	21.24	113.50	11.41	32.65	40
Last year.....	21.94	26.70	61.25	5.85	32.55	44

**SCHEDULE No. 8.—REPAIRS TO MAINS, HYDRANTS AND VALVES
DURING THE YEAR 1892.**

DESCRIPTION.	30"	24"	20"	16"	12"	10"	8"	6"	4"	3"	Hydrant valves renewed.	Hydrant rods broken.
Main pipes broken	1		1	2	2	3	8	7	21			
Joints blown out		3	1		12	19	8	14	29	1		
Stop-valves renewed.....							3	4	14			
Valves spindles renewed...	1				1	3	1	10	11		247	27

REPAIRS &c., TO SERVICES.

Leaking over drains.	Couplings leaking.	Burst in wall.	Ground cocks renewed.	Wooden boxes re- placed by iron ones.	Wooden boxes renew- ed where new foot- paths laid.	Old kind cocks re- placed by pneumatic valve.
69	110	76	299	550	1370	99

Tubes changed from inside houses to out- side in street.	Services choked.	Frozen outside.	Frozen inside.	Frozen in wall.	False reports.	Leaks on services from va- rious cau- ses unde- fined.
1447	99	9	100	38	114	520

New 5 noz. patent hydrants put in during year 1892.....	143
do do in position up to January 1893.....	584
do 3 do do	70
do 2 do put in during 1892.....	7
do do in position up to January 1893.....	537
Total.....	1191

Pneumatic stop cocks put in during 1892 (new work).....	1890
Pneumatic stop cocks, put in up to January 1893 (new work and repairs).	17,525

**HYDRANTS FROZEN DURING YEAR COMMENCING JANUARY 1892,
ENDING DECEMBER 1892.**

January.	February.	March.	December.	Total hydrants frozen.
666	731	536	393	2,326

Branch shops included in this report.

JOHN FALLEN,
Foreman at Shop.

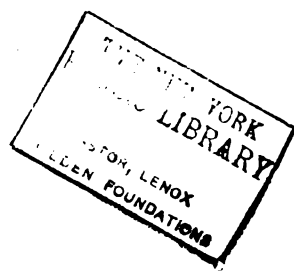
No. 3.—SCHEDULE SHOWING THE WORK OF STEAM ENGINE No. 1.

MONTHS.	Pumping time.	Revolutions.	Gallons pumped.	COAL USED IN POUNDS.			Av. pressure in air vessel.	IN POUNDS.					
				For pumping.	For banking.	To raise 1,000,000 gallons.		Cylinder grease.	Valvoline.	Seal oil.	Castor oil.	Cylinder oil.	Coal oil.
1892.	Hrs. M.												
January...	276.30	235,052	129,278,600	425,350	52,820	3,698	75	.....	.....	79.87	56.25	192	11.
February...	553.05	487,587	368,172,850	848,070	21,580	3,242	73	.....	.....	79.87	63.00	192	192
March.....	740.00	594,094	326,751,700	1,068,590	.....	3,270	72	.....	.....	79.87	67.50	224	24
April.....	86.00	58,927	32,409,850	105,770	1,760	3,317	71	.....	.....	8.14	6.12	24	24
May.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June.....	87.05	68,786	37,832,300	134,750	19,250	4,070	75	14	.....	.....	24.75	32	24
July.....	208.05	151,211	83,166,050	280,740	33,870	3,783	77	28	.....	17.75	42.75	.....	40
August.....	320.40	266,246	124,435,300	414,200	38,240	3,635	75	42	.....	17.75	63.00	24	48
September.	265.30	216,584	119,121,200	335,590	35,320	3,533	75	21	.....	26.62	56.25	64	48
October.....	36.25	27,998	15,398,900	52,510	10,670	4,102	75	.....	15.25	8.87	11.25	.....	24
November...	144.10	116,745	64,209,750	203,480	20,850	3,524	75	.....	52.50	17.75	27.00	.....	32
December..	8.00	6,309	3,469,950	11,110	20,150	9,008	.....	.....	.....	.....	2.25	.....	.....
Total.....	2,725.30	2,229,539	1,204,246,450	3,932,160	254,510	3,476	75	105	67.75	336.49	420.12	762	792
Average....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Last year...	2,954.25	2,469,831	1,358,407,050	4,500,620	391,160	3,692	75	.....	.....	404.49	570.00	1,880	768
Average...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

"	"	"	"	"	"	"	"	"	"
Feb.	"	"	"	"	"	"	"	"	"
Notre-Dame corner Fulford.....	1	"	"	"	"	"	"	"	"
Visitation corner Larivière.....	1	"	"	"	"	"	"	"	"
Centre west of Charlevoix	"	"	"	"	"	"	"	"	"
College street.....	3	"	"	"	"	"	"	"	"
Sherbrooke opp. Normal school.....	3	"	"	"	"	"	"	"	"
Centre corner island	4	"	"	"	"	"	"	"	"
Dzery south of Ontario.....	"	"	"	"	"	"	"	"	"
Amherst at Chertier.....	"	"	"	"	"	"	"	"	"
Dorchester cor. German	6	"	"	"	"	"	"	"	"
" East Sanguinet.....	8	"	"	"	"	"	"	"	"
St. Dominique cor. Charbonneau	"	"	"	"	"	"	"	"	"
St. Paul cor. St. Nicholas.....	8	"	"	"	"	"	"	"	"
Notre-Dame below Cuvillier.....	10	"	"	"	"	"	"	"	"
Magdalen near R. Tract.....	"	"	"	"	"	"	"	"	"
St. James cor. Cathedral.....	"	"	"	"	"	"	"	"	"
St. Catherine cor. Visitation.....	"	"	"	"	"	"	"	"	"
Papineau at Rachel	12	"	"	"	"	"	"	"	"
Peel at Windsor	13	"	"	"	"	"	"	"	"
Charlevoix cor. St. Charles.....	15	"	"	"	"	"	"	"	"
Conde cor Richardson	17	"	"	"	"	"	"	"	"
Dorchester east Campeau.....	18	"	"	"	"	"	"	"	"
Aqueduct below Dorchester.....	19	"	"	"	"	"	"	"	"
St. Luke corner St. Mathew	20	"	"	"	"	"	"	"	"
Roy corner St. Dominique	22	"	"	"	"	"	"	"	"
Sherbrooke cor. St. Mathew	23	"	"	"	"	"	"	"	"
St. Patrick cor. Island	24	"	"	"	"	"	"	"	"
Sherbrooke opp. Laval.....	25	"	"	"	"	"	"	"	"
St. Catherine last hy. west.....	26	"	"	"	"	"	"	"	"
St. Paul cor. Dupré.....	27	"	"	"	"	"	"	"	"
Farm street	29	"	"	"	"	"	"	"	"
Rivard 2nd ab. Mary Ann.....	March 2	"	"	"	"	"	"	"	"
"	3	"	"	"	"	"	"	"	"

No. 8 *Cont'd*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Perrins corner Campeau.....	March 4	.....	.....	.....	Put in new valve	Hyd. valve leaking worn out
Logan corner Harbour.....	" 5	6"	.....	.....	Recalked joint	Joint blown out.
Dorchester opp. Mark.....	" 7	.....	.....	.....	Repaired hydrant rod	Hydrant rod broken.
Champ de Mars cor. Lacroix.....	" 8	.....	.....	.....	Put in new valve	Hyd. valve leaking worn out
Sherbrooke corner Drummond...	" 9	.....	.....	.....	" "	" "
Champ de Mars east Bonsecours	" 10	.....	.....	.....	" "	" "
Manufacturers and Dargenson...	" 11	.....	.....	.....	" "	" "
St. Patrick corner Charlevoix....	" 12	.....	.....	.....	" "	" "
St. Catherine cor. McGill Col. Av.	" 14	.....	.....	.....	" "	" "
Plessis south of Ontario.....	" 15	.....	.....	.....	" "	" "
Duke street south of Wellington	" 16	.....	.....	.....	" "	" "
Wellington corner Bourgeois....	" 17	.....	.....	.....	" "	" "
Cote des Neiges cor. Summerhill	" 18	.....	.....	.....	" "	" "
Lagauchetiere corner Wolfe.....	" 19	4"	.....	.....	Put in new piece pipe	Pipe broken.
Windser near St. James.....	" 21	.....	.....	.....	Put in new valve	Hyd. valve leaking worn out
Champ de Mars.....	" 23	6"	.....	.....	Put in new piece 6 inches.	Main split about 4 f. long.
St. Catherine west of Mance.....	" 24	.....	.....	.....	Put in new valve	Hyd. valve leaking worn out
Notre Dame corner Chatham....	" 26	.....	.....	.....	" "	" "
Duluth Av. corner Mitchison....	" 28	24"	.....	.....	Cleaned and oiled valve 24 in.	" "
Pipe track.....	" 30	4"	.....	.....	Put in piece 4 inch pipe	Main old and broken.
St. Alexander off St. Catherine...	" 31	4"	.....	.....	Repacked 4 inch valve	Old packing worn out.
" corner Lagauchetiere	"	.....	.....	.....	Put in new valve	Hyd. valve leaking worn out
Guy south of Dorchester.....	April 1	.....	.....	.....	" "	" "
Grand Trunk south Laprairie....	" 2	10"	.....	.....	Recalked joint	" "
Arthur corner Sauter.....	" 4	10"	.....	.....	Recalked joint	" "





Papineau square.....	May	7	10"	Altering 10 in. pipe in Basin.....	
Notre-Dame and St. Sulpice.....	"	7	10"	Changing stone for iron frames.....	Hydrant valve worn out.
Ontario corner Iberville.....	"	9	"	"	"
St. Urbain below Vitre.....	"	9	"	"	"
Aqueduct at R. R. Crossing.....	"	9	"	Recalked joint.....	Joint blown out.
Versailles.....	"	9	"	"	"
Summer Hill avenue.....	"	10	"	"	"
Duluth Av and Calieux.....	"	"	"	"	"
St. Peter corner Commissioners..	"	"	"	"	"
Cote des Neiges road.....	"	11	"	"	"
Gunning corner William.....	"	"	"	"	"
College corner McGill.....	"	12	"	Cleaning valve spindle.....	"
Dorchester near Beaver Hall.....	"	12	"	Repaired leak on pipe to hydrant.....	Hydrant valve worn out.
Iberville corner Logan.....	"	13	"	Recalked joint.....	"
Notre-Dame corner of Desery.....	"	13	"	Drain put to hydrant.....	Joint blown out.
Notre-Dame S. opposite 161.....	"	14	"	"	To suit line of street.
Fountain Place d'Armes square.....	"	16	"	Cleaning drain from fountain.....	"
DeBrosolles cor. of St. Dizier.....	"	"	"	"	"
Notre-Dame corner Voltigeurs.....	"	18	"	"	"
Notre-Dame corner Seigneurs.....	"	"	"	"	"
Napoleon cor. St. Lawrence.....	"	4	"	"	"
Dorchester E. of St. Elizabeth.....	"	10	"	"	"
Simpson east.....	"	19	"	"	"
Liverpool cor. Coleraine.....	"	"	"	"	"
Dorchester corner Cathedral.....	"	20	10"	"	"
Sherbrooke corner Shaw.....	"	"	"	"	"
Craig corner Cote.....	"	21	"	"	"
Greenshields Lane.....	"	"	3"	"	"
Notre-Dame corner Seigneurs.....	"	"	"	"	"
Sherbrooke cor. St. Famille.....	"	23	30"	"	"
Conway at River Side.....	"	"	"	"	"
Hanover corner Belmont.....	"	24	"	"	"
Youville corner St. Peter.....	"	25	6"	"	"
St. Catharine corner St. Phillip.....	"	26	"	"	"
Notre-Dame corner Dupre Lane.....	"	"	10"	"	"

No. 8 *Cont'd*.—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Seigneurs corner St. James	May 27	.....	.....	.....	Repaired hydrant chamber.....	Old chamber.
Sussex corner Quiblier.....	" 28	.....	.....	.....	Raising valve cover.....	Raising street grad.
St. James corner Windsor.....	" 30	4"	.....	.....	Recaulked joint.....	Joint blown out.
Canal corner St. Etienne.....	" 31	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
Ontario corner Beaudry.....	June	.....	.....	.....	Raised hydrant to new level.....	Street grade raised.
Bleury corner Dorchester.....	"	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
Notre-Dame cor. Place d'Armes.....	" 1	.....	.....	.....	"	"
Shaw below Ontario.....	" 2	.....	.....	.....	Raising hydrant to level of street.....	Street grade raised.
DesalaBerry corner Craig.....	" 24	.....	.....	.....	Put in new spindle.....	Spindle broken.
Lagau heiere corner Bleury.....	" 3	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
College corner Inspectois.....	" 210	.....	.....	.....	" spindle 10 in.....	Spindle broken.
Dorchester near Essex.....	" 46	Main.....	.....	.....	" piece.....	Piece blown out.
Ottawa corner McCord.....	" 410	.....	.....	.....	" iron frame over valve.....	Removed wooden one.
Ontario av. corner Sherbrooke.....	" 6	.....	.....	.....	" valve.....	Hydrant valve worn out.
Dubord corner Berri.....	" 61	.....	.....	.....	" piece.....	Main broken.
Albert at Masterman.....	" 7	.....	.....	.....	" valve.....	Hydrant valve worn out.
Alwater Av. corner Sherbrooke.....	" 12	.....	.....	.....	Repaired valve.....	Old packing worn out.
Workman corner Kulford.....	" 8	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
Dows Brewery yard.....	" 8	.....	.....	.....	"	"
McGill below Foundling.....	" 9	.....	.....	.....	"	"
St. Maurice street.....	" 9	.....	.....	.....	"	"
Ontario corner Visitation.....	" 9	.....	.....	.....	Raised hydrant to new level.....	Street grade raised.
Amherst corner Mignonne.....	" 106	.....	.....	.....	Oiled valve spindle.....	"
Logan corner Poupert.....	"	.....	.....	.....	Raised valve stone.....	"
Inspectors corner William.....	" 11	.....	.....	.....	"	"
Notre-Dame corner Papineau.....	" 13	.....	.....	.....	Put on iron crosses inst'd of v'se stone.....	Valve stones removed.

Location	Date	Work	Remarks
St. Catherine corner Cedar	"	"	" valve worn out.
Lagauchetiere corner Bleury	"	"	" " "
Plessis corner Logan	16	"	rod too short.
Kulford corner St. Anoin	"	"	Pipe broken.
Concord corner Bleury	17	"	Removed stone cover.
McGill south of Four ling	18	"	Street newly graded.
Notre Dame corner Papineau	19	"	Chamber old.
Opposite 78 Inspectors	"	"	To suit level.
Exhibition grounds	20	"	Joint blown out.
Guy corner Sherbrooke	"	"	Joint split by frost.
Peel north side St. Catherine	21	"	Charged to improvement.
M. Gill near Wellington	"	"	Hydrant valve worn out.
Mt. Royal Av. cor. Park Av.	22	"	" " "
Drummond at St. Catherine	"	"	" " "
Dalhousie street	23	"	" " "
University corner Pine avenue	"	"	To level of street.
Union Av. corner Dorchester	24	"	" " "
Brunswick "	"	"	" " "
St. Antoine corner Mountain	25	"	Stone one removed.
St. Catherine and Cedar	27	"	Sand-hole in seat of hydrant.
Notre-Dame corner St. Henry	"	"	Hydrant valve worn out.
Colborne corner of Common	28	"	Packing worn out.
William " Young	29	"	12 in. joint blown out.
Richmond st. south of Richm'd sq	"	"	Hydrant valve worn out.
Duke corner Brennan	30	"	" " "
Ontario corner St. Dominique	"	"	Street grade raised.
Latour corner St. Genevieve	July	"	Hydrant valve worn out.
Britannia corner Menal	"	"	" " "
L'Allemard corner Notre-Dame	"	"	Wooden valve cover removed.
St. Catherine corner Baudry	"	"	Sev'l to Carlslake Hotel.
St. James corner Windsor	31	"	Packing worn out.
Shuler corner Sherbrook	32	"	To suit new footpaths.
St. Hubert street	4	"	"

No. 8 *Cont'd*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter of mains.	Valves.	Hydrants.	HOW REPAIRED	Probable cause of injury.
Murray n. s. of William street ..	July	4 6"	1	1	Renewed spindle	Old one broken.
Notre-Dame and Seigneurs.....	"	5	1	1	Put in new valve	Hydrant valve worn out.
Latour street.....	"	5	1	1	"	"
Duluth Av. and Cadieux	"	6	1	1	"	"
St. Dominique and Rachel.....	"	6	1	1	Repacked 4 in. valve	Packing worn out.
Ontario and Papineau.....	"	7 6"	1	1	Renewed 6 in. spindle	Old one
St. Mark corner Tupper.....	"	7 6"	1	1	"	Thread stripped.
Dorchester Cathedral	"	8	1	1	Changing position of hydrant	To new line of footpath.
McGil College Av. & St. Catherine ..	"	8 2 1/2"	1	1	24 in. Rebuilt valve chamber	Old one dangerous.
Ontario and St. Hubert	"	9	1	1	Putting valve cover	To new level of street.
Mignonne and Parthenais	"	9 1 1/2"	1	1	Putting bonnet on 12 in. pipe	Bonnet blown off 12" pipe.
Dorchester and Cathedral	"	9	1	1	Lowering valve stone	To level of street.
German opp. No. 80	"	11	1	1	Put band on 4 in. pipe	Hole in main pipe worn away
Vitré corner St. Dominique.....	"	11 6"	1	1	Renewed 6 in. spindle	Spindle stripped.
St. Constant s. s. of Mignonne...	"	11	1	1	Repacked 4 in. valve	Packing worn out.
St. James west of Cathedral.....	"	12	1	1	Put in new valve	Hydrant valve worn out.
Visitation and St. Catherine	"	12	1	1	"	"
University opp. Prince, Arthur.....	"	12	1	1	"	"
Robin and Montcalm	"	13	1	1	"	"
Nazareth and Common	"	13	1	1	"	"
Panet and St. Rose.....	"	13	1	1	"	"
McCord and Murray	"	14	1	1	"	"
Riverside and Briannia	"	14	1	1	"	"
St. Rose and Visitation	"	14	1	1	Repacked 4 in. valve	Old packing worn out.
Itedpath and Pine Av.....	"	15	1	1	"	"
St. Thérèse and St. Vincent.....	"	15	1	1	"	"

18	10"	Durchester and Amherst.....	Renewed 10 in. spindle.....	Joint blown out.
18	2"	Mignonne and Amherst.....	" 12 in. "	"
18	10"	Dorchester and St. Urban.....	Recalked joint.....	Joint blown out.
19	10"	Mill E. of Weir.....	Renewed 10 in. spindle.....	Old spindle worn out.
19	"	Lagauchetière and Bleury.....	Put in new valve.....	Hydrant valve worn out.
19	"	Jurors opp. Anderson.....	"	"
20	"	Robin and Montcalm.....	"	"
20	"	V. I. re and Sanguinet.....	"	"
21	"	Lagauchetière and St. Dominique.....	"	"
22	"	Wellington and Farm.....	"	"
22	"	Roy corner Notre-Dame.....	Put in new iron valve cover.....	Old stone removed.
23	"	Logan and Champlain.....	Rebuilt hydrant chamber.....	Old age.
23	"	St. Peter and St. Paul.....	Repacked valve.....	Old packing worn out.
23	4"	St. Marc and St. Catherine.....	Put in new spindle.....	Old spindle "
26	0"	Atwater Av. near W. House.....	Put in new breeches pipe.....	Old one split by excess pers
27	"	Wellington corner Ann.....	Put in new valve.....	Hydrant valve worn out.
27	"	St. Patrick 1st hydrant.....	"	"
28	"	Rivard and Berri.....	"	"
29	"	and Rachel.....	iron frame.....	Old stone removed.
30	"	Longueuil lane and Notre-Dame.....	"	"
30	"	Atwater Av. and St. Catherine.....	Recalked joint.....	2 in. joint blown out.
Aug.	1	Dubord and Sanguinet.....	Recalked valve gate.....	Valve gate down.
"	1	Wellington and Nazareth.....	Put in new valve.....	Hydrant valve worn out.
"	2	St. Paul and St. Nicholas.....	"	"
"	2	Common near Prince.....	Recalked joint.....	Joint blown out.
"	3	Commissioners and Jac-Cartier.....	Put in new valve.....	Hydrant valve worn out.
"	3	Richmond and Richardson.....	" piece.....	Hole in pipe to hydrant.
"	4	Lagauchetière and Cathedral.....	Repacked valve.....	Old packing worn out.
"	4	Dominion street.....	Recalked joint.....	2 in. joint blown out.
"	5	Mullins street.....	Put in new valve.....	Hydrant valve worn out.
"	5	Atwater Av. corner Centre.....	" 30 in. breeches.....	Old one split.
"	6	Island at Railway crossing.....	" valve.....	Hydrant valve worn out.
"	6	Ontario and Iberville.....	Recalked joint.....	Joint blown out.

No. 8 *Cont'd*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Common and Prince.....	Aug.	5 1/2"	1	1	Recaulked joint.....	Joint blown out.
Lapacheliere and St. Margaret.....	"	4	1	1	Rebuilt hydrant chamber.....	In bad order.
Atwater Av. and St. Catherine.....	"	8 12"	1	1	Recaulked joint.....	12 in. joint blown out.
Beury opp. Concord.....	"	9 24"	1	1	Put in 1. length 24 in. pipe.....	Pipe split on 1 - 1. k.
Chaboillez square.....	"	5 1/2"	1	1	Repacked valve chamber.....	Abandoned.
Arpueduct ab. Notre-Dame.....	"	10"	1	1	Repacked valve.....	Old packing worn out.
Richmond.....	"	10"	1	1	"	"
Versailles.....	"	10"	1	1	"	"
Charlevoix and Grand Trunk.....	"	11	1	1	Put in new valve.....	Hydrant valve worn out.
St. Catherine corner Sussex.....	"	6	1	1	"	"
Sherbrooke.....	"	12	1	1	"	"
" St. Marc.....	"	12	1	1	"	"
" Mansfield.....	"	12	1	1	"	"
Wellington at Subway.....	"	13	1	1	Moved hydrant to line of footpath.....	Changing line of footpath.
Chaboillez Sqr N. S.....	"	6	1	1	Put in new valve.....	Hydrant valve worn out.
St. James corner St. Gabriel.....	"	6	1	1	"	"
N. Dame opp. Balmoral.....	"	6	1	1	"	"
" corner Marlboro.....	"	6	1	1	"	"
St. Lawrence corner Ontario.....	"	14 12"	1	1	Put in new iron frame.....	Removed wooden frame.
Amherst below St. Catherine.....	"	10"	1	1	Raised valve cover to new level.....	Street grade changed.
Inspectors corner Chaboillez sqr.....	"	10"	1	1	Put in new iron frame.....	Old valve stone removed.
St. Genevieve corner St. Antoine.....	"	6 1/2"	1	1	"	" wood removed.
Sanguinet and Rachel.....	"	6	1	1	Raised valve cover to level of street.....	Street grade changed.
Latour and St. Genevieve.....	"	10"	1	1	Rebuilt valve chamber.....	Old one falling in.
Roy and Brolet.....	"	15 3/4"	1	1	Put in new spindle.....	Old spindle drained.
Notre-Dame corner Guy.....	"	10"	1	1	Repacked valve.....	Old packing worn out.
Sherbrooke corner Repath.....	"	16	1	1	Put in new valve.....	Hydrant valve worn out.

Wellington corner Colborne.....	Aug. 16	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
St. Dominique and Rachel.....	"	"	.....	.....	Put in new valve stone.....	Removed wood one.
Drolet corner Rachel.....	" 17	.....	.....	.....	" " " "	" " "
Berri corner Roy.....	" 18	.....	.....	.....	" " " "	" " "
Mary-Ann and St. Denis.....	" 19	.....	.....	.....	" " " "	" " "
Drolet and Mount-Royal Av.....	" 20	.....	.....	.....	" " " "	" " "
Pantaleon and Napoleon.....	" 22	.....	.....	.....	Moved valve cover.....	To suit electric rails.
St. Lawrence corner St. Cathar.....	" 22 1/2	.....	.....	.....	Repacked valve.....	Old packing worn out.
Amherst corner St. Catherine.....	" 23	.....	.....	.....	" " " "	" " "
Sherbrooke corner St. Matthew.....	" 23 1/2	.....	.....	.....	Put in new bolt.....	Bolt broken.
Atwater Av. corner Notre Dame.....	" 24	.....	.....	.....	Recaulked 3 joints.....	3 24 in. joints blown out.
Pino Av. corner Drolet.....	" 24 1/2	.....	.....	.....	Put in new valve.....	Cut by stones pipe.
McTavish opp. Carleton Road.....	" 25	.....	.....	.....	Recaulked joint.....	30 in. joint blown out.
Notre-Dame and Marlboro.....	" 26	.....	.....	.....	Cleaned drain.....	Hydrant drain choked.
Commissioners at C. H. Square.....	" 27	.....	.....	.....	Put in new valve.....	" valve worn out.
Wellington corner Colborne.....	" 28	.....	.....	.....	" " " "	" " "
St. James corner St. Gabriel.....	" 29	.....	.....	.....	Repacked valve.....	Old packing worn out.
St. Martin S. S. Notre-Dame.....	" 30	.....	.....	.....	Put in new valve.....	Hydrant valve cut by slot
Préfontaine ab. Logan.....	" 31	.....	.....	.....	" " washer.....	Washer on hyd.col. worn o
St. Catherine corner Dezery.....	" 32	.....	.....	.....	Moved valve cover.....	To suit Electric Railw.
Park Av. corner Sherbrooke.....	" 33	.....	.....	.....	" " " "	" "
Chaboillez Square near Albert.....	" 34	.....	.....	.....	Put in stone cover.....	Removed old wood one.
Rachel corner Papineau.....	" 35	.....	.....	.....	" " " "	" " "
" " Sydenham.....	" 36	.....	.....	.....	" " " "	" " "
St Louis square at Laval Av.....	" 37	.....	.....	.....	" " " "	" " "
Rivard corner Duluth Av.....	" 38	.....	.....	.....	" " " "	" " "
Cadieux " Prince Arthur.....	" 39	.....	.....	.....	" " " "	" " "
Amherst corner Sherbrooke.....	" 40	.....	.....	.....	Moved valve cover.....	To suit Electric Railway.
Mount-Royal Park.....	" 41	.....	.....	.....	Put in new valve.....	Hydrant valve worn out.
King and Common.....	" 42	.....	.....	.....	" " spindle.....	Old spindle stripped
Sherbrooke opp. McGill College.....	" 43	.....	.....	.....	" " valve.....	Hydrant valve worn out.
Lafontaine corner Maisonneuve.....	" 44	.....	.....	.....	" " " "	" " "
Notre Dame corner Murray.....	" 45	.....	.....	.....	" " " "	" " "

No. 8 *Cont'd*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
King south of Wellington	Aug. 31	4"	1	1	Repacked valve	Old packing worn out.
Wellington corner Farm	" "	" "	"	"	Put on new washer	Washer on hydrant col. cut.
Inspectors opp. 78	" "	4"	"	"	" in " piece	Selling across a boulder.
Wolfe south side of Craig	" "	6"	"	"	Repacked valve	Old packing worn out.
Papineau Av. north side Craig	" "	10"	"	"	" "	Old packing worn out.
St. Etienne at G. T. Offices	" "	" "	"	"	Put in new valve	Hydr. valve cut by stone.
St. Alexander and Jurors	" "	" "	"	"	Tightened valve rod	" rod loose and leaking.
Lagauchetiere corner Bleury	" "	" "	"	"	" "	" "
Peel bel. Pine Av.	" "	6"	"	"	Raised 6 in. main	To allow drain to pass.
Poupart corner Logan	Sept. 1	" "	"	"	Put on new valve stone	Removed wooden one.
St. Martin S. side Notre Dame	" "	" "	"	"	Rebuilt valve chambers	Old chambers falling in.
Iberville corner Mignonne	" "	" "	"	"	Put in new valve stone	Removed wooden one.
Darling corner St. Catherine	" "	" "	"	"	" "	" "
Dezery " Mignonne	" "	" "	"	"	" "	" "
Latour " St. Mouique	" "	" "	"	"	" "	" "
Maple " itach-l	" "	" "	"	"	Raising valve stone	To grade of streets.
Marlboro and St. Catherine	" "	" "	"	"	Put in new valve stone	Removed wooden one
Moreau and Lafontaine	" "	" "	"	"	" "	" "
Prince opp. 60	" "	4"	"	"	Put in new piece 4 in. pipe	Piece blown out.
Ottawa corner Shannon	" "	" "	"	"	Caulked hydrant joint	Joint
Park Av	" "	" "	"	"	Moved hydrants	To suit Electric Railway.
St. Catherine corner Fort	" "	12"	"	"	Repacked joints	Joint blown out.
Lagauchetiere " Bleury	" "	" "	"	"	Put in new valve	Hydrant valve worn out.
Wellington near subway	" "	6"	"	"	" "	" "
Queen corner Wellington	" "	6"	"	"	Put in new spindle	Old spindle stripped.
St. Elizabeth corner Craig	" "	6"	"	"	" "	" "

Jac-Cartier Square and St. Paul Sept.	7	Put in new hydrant valve.....	Hydrant valve worn out.
Duluth Av. corner Hivard	"	"	"
Delorimier Av. corner Ontario	8	Put in 2 noz. hydrant.....	Took out old taper hydrant joint blown out.
St. Phillip str. et. A.....	8 1/2	Recalked joint.....	Hydrant valve worn out.
Guy at St. Antoine.....	9	Put in new valve	Removed wooden one.
Logan corner Morveau.....	10	" " " stone	"
Peel near Reservoir.....	"	" " " "	"
St. Lawrence corner Rachel.....	"	Relaying hydrant cover.....	Cover too loose.
Fulford corner Notre Dame.....	"	" " " "	"
Guy corner Notre Dame.....	"	" " " "	"
Mignonne corner St. Lawrence.....	12 1/2	Put in new spindle	Old spindle twisted.
St. Lawrence at Mignonne.....	"	Put in new rod.....	Hydrant rod broken.
Craig corner Wolfe.....	"	" " " valve.....	" valve worn out.
Allard corner Visitation.....	13 1/2	" " " spindle.....	Old spindle broken.
Visitation corner Mignonne.....	"	" " " valve.....	Hydrant valve worn out.
Fortification Lana.....	"	Cleaned valve.....	Valve gate choked.
Cadieux corner Duluth Av.....	14	Put in new valve.....	Hydrant valve worn out.
Lagauchetiere corner Wolfe.....	"	" " " "	"
Drummond corner Dorchester.....	"	Repacked "	Old packing
Wellington " Magdalen.....	"	Put in new "	Hydrant valve
Park Av. corner Mount Royal Av.....	15	" " " "	"
Commissioners corner J.-C. Sqr.....	"	" " " taper to hydrant.....	Old one out of order.
St. James and Tasignan.....	"	" " " stone.....	Removed wooden one.
Sherbrooke and University.....	16	" " " "	"
Ontario and Harbour.....	"	" " " "	"
" corner St. Chs.-Borrome.....	"	Moving hydrant.....	To new line of street.
" " " Maisonneuve.....	"	Taking away hydrant.....	Not required.
Bleury " Dowd.....	17	" " " "	"
Moreau " Marlboro	"	Put on new valve stone.....	Removed wooden cover.
" " and Robillard.....	18	" " " "	"
" corner Forsyth.....	"	Lowering 4 in. main	To allow drain to pass.
Mignonne and Iberville.....	"	Put on new valve stone.....	Removed wooden cover.
Mountain S. S. of St. James.....	19 1/2	Tightened valve gate.....	Nut in valve gate loose.
Common corner Port.....	"	Put in new valve.....	Hydrant valve worn out.
Brennan " Prince.....	"	" " " "	"

No. 8 *Cont'd*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Berri corner Dorchester	Sept. 19	"	1		Repacked 4 in. valve.....	Packing worn out.
Beaudry corner Robin.....	" 20	"			Put new valve in.....	Hydrant valve worn out.
Dorchester " Rlbury.....	" "	"			Putting drain to hydrant.....	
Mance corner Milton.....	" 21	"			Repaired rod.....	Hydrant rod crooked.
St. Famille at Prince Arthur.....	" 22	10"	1		Easing spindle.....	
Commissioners at C. P. R. Elevator.....	" "	"			Dug to put new gasket.....	
Lagauchetiere and Plessis.....	" 23	"			Recalked 2 joints.....	{ Rubber packing on bottom of column of hyd. leaking.
Ontario and Moreau	" "	"			Put in new valve.....	joints b'n out on hyd. pipe.
Albert corner Mountain.....	" 24	"	1		Put new stone cover.....	Hydrant valve worn out.
Rose " Maisonneuve.....	" 26	"			Recalked joint.....	Wood cover removed.
Charron and Wellington.....	" 27	"	1		Renewed spindle.....	Joint blown out.
Park Av. opp. Duluth Av.....	" "	"			Put in new valve.....	Spindle broken.
Park near Mount-Royal Av.....	" "	"	1		Moving hydrant opp. side street.....	Hydrant valve worn out.
Craig corner German.....	" 28	"	1		Put in new valve.....	(On acct. being too near fence
Ontario " Maisonneuve.....	" 29	"	1		" " " " " " " " " " " "	Hydrant valve worn out.
St. Catherine corner Cuvillier.....	" "	"	1		" " " " " " " " " " " "	" " " " " " " " " " " "
77 Visitation street.....	" "	11"			Lowering 4 in. main.....	To allow drain to pass.
McGill College Av. cor. St. Oather	" "	12"			Recalked joint.....	Joint blown out by pressure.
Pine Av. cor. Durocher.....	" "	"			{ Protecting 12 inch main H. L. by wood casing.....	{ Road Department blasting under ground.
Bronsdon Lyne	" 30	11"			Recalked joint.....	Joint blown out by pressure.
St. Catherine and Cuvillier.....	" "	"			Recalked 8 in. joint.....	Joint blown out by pressure.
Albert street at Masterman.....	" "	"			Put in new valve.....	Joint to hydrant blown.
Harbour below Ontario.....	" "	"			Lowered hydrant.....	Valve worn out.
Cardoux street.....	" "	"			Painted H. L. hydrant to white.....	Street grade lowered.

		30 1/2"	Sept.	Protecting H. L. main by wood cast'g Road Dept blast'g undergr'd	
Line Av. and Huroncher...	1	1	Oct.	Put in new valve	Valve worn out.
St. Elizabeth between Dorchester & St. Catherine	1	1	Oct.	Lowering hydrant	Street grade lowered.
Harbour above Lafontaine	1	1	"	Raised hydrant	To level of street
Albert street at Masterman	1	1	"	Put in new valve	Hydrant valve worn out.
St. Bernard street	16"	1	"	" " spindle	Old spindle broken.
St. Urbain and Craig	3	1	"	" " valve	Valve worn out.
Corner Ontario and St. Hubert	3 24"	1	"	Discont'd 24 in. drain at subway	
Ontario at subway	3	1	"	Put in new valve	Valve worn out.
Corner Heury and Edward	3 34"	1	"	Recalked joint (4 inch)	Blown out.
Seigneurs and William	4 4"	1	"	Put in new valve	Old one worn out.
Bruchési and Notre Dame	4 4"	1	"	Recalked joint	Joint blown out.
246 Aqueduct	4 6"	1	"	" "	" "
Common near St. Nicholas	4	1	"	Raised hydrant chamber	Sunk by settling.
34 King street	4	1	"	Put in new valve	Valve worn out.
Canning and St. James	5 4"	1	"	Repacked valve	Old packing worn out.
Peel and Sherbrooke	5 4"	1	"	" "	" "
Stanley and "	5	1	"	Raised hydrant chamber	Sunk by settling.
Visitation and Mignonne	5	1	"	Put in new valve	Valve worn out.
Albert and Bruchési	5	1	"	" "	Old packing worn out.
Fortier " Cadieux	5 1"	1	"	Put in new valve	Sunk by settling.
Corner Magdalen and Faward	5 4"	1	"	" " drain to hydrant	Valve worn out.
Wellington and Magdalen	6 10"	1	"	" " new spindle	Old one shipped by forcing.
Noir - Dame off Dufréne	6	1	"	Recalked joints	broken defect. cast'g
686 Dorchester	6 1"	1	"	" "	Joint blown out
Mullins corner Wellington	7 20"	1	"	Repacked valve	" "
53 Park Av.	7	1	"	Put in new length	Old packing worn out.
Corner Cadieux and Napoleon	7	1	"	" " valve	one broken defect. cast'g.
Ahmerst and Mignonne	7	1	"	Took out hydrant	Old packing worn out.
" Houle	8 20"	1	"	Moved hydrant	Not required.
Opp. 51 Park Av.	8	1	"	Reported before	To new line of streets.
Plessis and Lagauchetière	8 4"	1	"	Put in new valve	Old valve worn out.
Noire Dame at Dow's brewery	10 10"	1	"	Repacked "	Old valve packing worn out.
Dorchester at St. Denis	" 24"	1	"	Recalked joint	Joint blown out.
Ottario at Subway		1	"	Discont'd 24 in main	For subway.

Dorchester and St. Alphonse.....	"	.....	.....	Grading valves.....	.....	To line and level of street.
" " Champlain.....	"	.....	.....	" " ".....	.....	" " ".....
" " St. Dominique.....	"	.....	.....	" " ".....	.....	" " ".....
Barclay and Notre-Dame.....	"	19 3/4	.....	Repacked 4 in. valve.....	.....	Packing worn out.
St. Elizabeth and Craig.....	"	"	.....	Put in new valve.....	.....	Hydrant valve worn out.
Notre-Dame and Shaw.....	"	"	.....	Grading valves.....	.....	To line and level of street.
St. Hubert " Mignonne.....	"	"	.....	" " ".....	.....	" " ".....
St. Ignace " Lagauchetiere.....	"	"	.....	Repacked 4 in. valve.....	.....	Packing worn out.
St. Alphonse " Dorchester.....	"	"	.....	" " ".....	.....	" " ".....
Maisonneuve and Dorchester.....	"	"	.....	" " ".....	.....	" " ".....
St. Mary Av. & St. Antoine.....	"	"	.....	Put in new valve.....	.....	Hydrant valve worn out.
St. James and St. Peter.....	"	"	.....	Grading valves.....	.....	To line and level of street.
Notre-Dame and Guy.....	"	"	.....	" " ".....	.....	" " ".....
Kent and Delorimier.....	"	20 1/4	.....	Put in new 4 in spindle.....	.....	Old one cracked.
Ontario and Visitation.....	"	"	.....	Grading valve stones.....	.....	To line and level of street.
Common and McGill.....	"	"	.....	" " ".....	.....	" " ".....
" " St. Frs-Xavier.....	"	"	.....	" " ".....	.....	" " ".....
Amherst and St. Catherine.....	"	"	.....	" " ".....	.....	" " ".....
Bleury and Lagauchetiere.....	"	21 6"	.....	Repacked 6 in. valve.....	.....	Packing worn out.
St. Lawrence and Portier.....	"	"	.....	" " ".....	.....	" " ".....
St. Lawrence.....	"	"	.....	" " ".....	.....	" " ".....
St. James and Cathedral.....	"	"	.....	Examining valves.....	.....	Broken by men lying St. r'y r.
Commissioners and McMill.....	"	"	.....	Put in new hydrant rod.....	.....	Falling in.
Ontario and Wolfe.....	"	"	.....	Renewed valve chamber.....	.....	To level of street.
Fortune " Wellington.....	"	22	.....	Grading valve cover.....	.....	Hydrant valve worn out.
Amherst and St. Catherine.....	"	"	.....	Put in new valve.....	.....	To level of street.
Ontario " Wolfe.....	"	"	.....	Grading valve stones.....	.....	" " ".....

No. *Continued*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

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No. 8 Cont'd—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION.	DATE.	Diameter	Valves	Hydrants	HOW REPAIRED.	Probable cause of injury.
Mansfield and St. Catherine.....	Nov.	21 1/4"	1	1	Put in new 4 inch valve.....	Old valve no good.
20 Shannon street.....	"	22 1/4"			Recaulked 4 inch joint.....	Joint blown out.
School House lane.....	"	23 "			Recaulked " main.....	"
Dorchester and Phillip.....	"	10 "			Recaulked 10 inch ".....	"
Cypress and Peel.....	"	12 "		1	Put in a new valve.....	Hydrant valve useless.
Opp. 425 St. James street.....	"	12 "			Recaulked joint.....	1 1/2 inch joint blown out.
McCord street.....	"	24 1/4"			Located box.....	Under footpath.
Pine Avenue and St. Urbain.....	"	25 1/4"	1		Put in 4 inch spindle.....	Spindle broken.
St. Catherine opp. Towers.....	"	4 "			Put in new piece.....	4 in pipe broke across dir'n cut
Aqueduct " Dorchester.....	"	10 "			Recaulked joint.....	10 inch joint blown out.
Mignonne and Shaw.....	"	4 "			" ".....	"
Forfur corner of St. Etienne.....	"	6 "	1		Repacked valve.....	Packing worn out.
Harbour at Gas Co's Yard.....	"	2 "		1	Put in new valve.....	Hydrant valve worn out.
St. Etienne.....	"	10 "			Repaired.....	Pipe split.
Parthenais and Mignonne.....	"	28 "		1	Put in new valve.....	Hydrant valve worn out.
Pine Av. N. of Oxenden.....	"	12 "		1	" ".....	Hydrant valve worn out.
Fulford and Delisle.....	"	29 "		1	" ".....	On eye of sinking of main.
St. James and St. Margaret.....	"	30 1/4"			Recaulked joint.....	Old hydrant valve worn out.
Shearer and Manufacturers.....	"	"		1	Removed wood & repaired hydrant.....	4 in. joint blown out.
Dupré and St. Paul.....	"	"	1		Repacked.....	1 piece wood caus'g it to leak
N. Dame at C. P. R. Station.....	Dec.	1 "		1	" ".....	Packing worn out.
90 Marsfield street.....	"	1 "		1	Putting new 5 noz.....	Old hydrant taken out.
Pine Avenue and University.....	"	1 "		1	Uncovered valve.....	Covered with stones.
61 Versaille street.....	"	2 1/4"		1	Recaulked joint.....	4 inch joint blown out.
Rachel and Mitchison.....	"	2 "		1	Raised valve cover.....	To new grade of street.
Pine Avenue and St. Lawrence.....	"	3 7/8"		1	Pumped water out of valve chamber.....	

No. 8 *Cont'd.*—Schedule showing the Repairs done to Main Pipes, Hydrants and Valves during year 1892.

POSITION	DATE	HOW REPAIRED,	Probable cause of injury,
St. Lawrence near Deboth Ave.	24	Repaired rod.	Hyd. rod broken by frost.
St. Lawrence at Deboth Ave.	26	Recaulked joint.	1/6 inch joint leaking.
Montclair and Robin	26	Hydrant rod removed.	Broken by frost.
Gene and St. Catherine	29	Put in new valve.	Hydrant valve worn out.
Stable and Dore at St. Anne	30	"	"
Prince Arthur and St. Eustache	30	Repaired by frost.	Hydrant broken by frost.
Dore at Roger	30	Replaced by perfect one 2 nozzles.	"
Charlem. street	31	Installed v've cover & lengthed pat. rod	Hydr. frozen in column, split To level of street.
Capthe street	"		

JOHN FALLON,

Foreman at shop.

TABLE No. 9.—SHOWING THE DIFFERENT KINDS AND SIZES
METERS BELONGING TO THE CITY AND TO PRIVATE
PARTIES FOR THE YEAR 1892.

	Sizes in inches.	Property of the City.				Private property.				
		In the City.	Outside City.	At work shpp.	Total.	In the City.	Outside City.	At work shop.	Total.	Grand total.
.....	10	.....	.....	2	2	.....	.....	.....	2	2
.....	6	4	1	1	6	4	.....	4	4	10
.....	4	14	.....	9	23	5	.....	5	5	28
.....	3	66	.....	7	73	9	.....	9	9	82
.....	2	30	.....	2	32	5	.....	5	5	37
.....	1½	8	.....	2	10	2	.....	2	2	12
.....	2	.....	.....	.....	.....	1	.....	1	1	1
.....	1	7	.....	9	16	.....	.....	.....	.....	16
.....	¾	21	.....	9	30	2	.....	2	2	32
ion ..	1½	2	.....	.....	2	.....	.....	.....	.....	2
.....	6	2	.....	.....	2	2	2	4	4	6
.....	4	20	1	.....	21	5	.....	5	5	26
.....	3	23	1	.....	24	3	.....	3	3	27
.....	2	22	3	.....	25	4	.....	4	4	29
.....	1½	20	.....	2	22	2	.....	2	2	24
.....	1	50	.....	.....	50	.....	.....	.....	.....	50
.....	¾	35	.....	13	48	2	.....	2	2	50
.....	¾	118	.....	10	128	2	.....	2	2	130
.....	2	10	.....	.....	10	.....	.....	.....	.....	10
.....	1	33	.....	3	36	1	.....	1	1	57
.....	¾	6	.....	.....	6	.....	.....	.....	.....	6
.....	¾	75	.....	9	84	.....	.....	.....	.....	84
on ..	¾	.....	.....	.....	.....	1	.....	1	1	1
.....	3	1	.....	1	2	.....	.....	.....	.....	2
.....	2	9	.....	1	10	5	.....	5	5	15
.....	1½	12	.....	1	13	1	.....	1	1	14
.....	1	34	1	13	48	.....	.....	.....	.....	48
.....	¾	50	.....	12	62	3	.....	3	3	65
.....	1	1	.....	2	3	.....	.....	.....	.....	3
.....	¾	5	.....	5	10	.....	.....	.....	.....	10
		678	7	113	798	59	2	61	859	

[illegible]

CONTINUING THE LIST, &c.—Continued.

Name of Ship	Length at keel (feet)	No. of Values										Wrought Iron Pipes	Hydraulic	Length of Lead Pipes	Hoses Supplied	Brass cocks	Air Cocks
		60"	36"	24"	18"	12"	10"	8"	6"	4"	Total						
Brought Forward		242				2				4	0		1	800	35	20	12
McGregor	621													16	1	1	
Canning	621													27	2		2
Stanley	621													195	8	3	5
Union Av	604													54	1	1	
University	590																
Argyle Av	619																
Versailles	621																
Guy	621																
Workman	621																
Dorchester	621																
Notre Dame	621																
Donagana	621																
Close	621																
Aqueduct	621																
St. Antoine	621																
Inspectors	621																
Pine Av	621																
Richmond	621																
St. Alexandre	621																
Aylmer	621																
Intour	621																
McKay	621																
McTavish	621																
Plymouth Grove	621																
St. Luke	621																
St. Monique	621																
Lagauchetière	621																
L. signan	621																
Metcalfe	621																
Prince Arthur	621																
Redpath	621																

SCHEDULE No. 10.—SHOWING THE PIPES, &c.—Continued.

NAME OF STREETS	Length in feet of cast iron pipes.										No. of Valves.										Wrought Iron Pipes.	Hydrants.	Lead Pipes in Fee.	House Supplied.	Brass Cocks.	Air Cocks.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	24"	20"	16"	12"	10"	8"	6"	4"	Total	30"	24"	20"	16"	12"	10"	8"	6"	4"	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Total

St. J. Bte. Ward.

Cadieux	202	997	26	1225	3	1	3	6	14	11	6132	345	81	262
Drolet											70	5	2	5
Laval Av.											689	49	2	47
St. Denis											76	1	1	2
St. Lawrence ..											237	24	4	10
St. Urbain											160	10	2	8
Sanguinet											192	10	16	3
Maple											30	3	3	3
Marie Anne											374	26	20	3
Berri											71	6	5	3
Mt. Royal Av.			4								284	18	4	14
St. Dominique ..	1188			1230	2	1			3	2	222	12	11	1
Deluth Av.											64	9	6	6
Dufferin											89	6	6	6
Plessis											171	8	3	8
Clarke											54	3	3	2
Montana											52	2	2	2
Pantaleon											30	1	1	1
Amherst											382	25	7	18
Mitchison											160	10	10	10
Sydenham											389	28	23	23
De Breboeuf											45	2	2	2
Rachel	877		16	897	2						176	10	10	10
Total	202	3009	89	3348	7	1			5	4	4547	284	43	241

Hochelaga W'd.

St. Catherine														
Moreau	4706		256	5086	9			3	12	12				
Marlborough											132	7	1	6
Logan											152	8	8	8
Mignonne											186	12	12	12
Préfontaine											110	6	6	6
Frontenac	1224		50	1317	3	1	2	6	4	4	482	21	8	13
Désery											189	9	1	8
Carried over	4706	1224	306	6403	9	3	1	5	15	16	1247	63	18	45

STANDARD BY THE MINISTERS OF THE INTERIOR AND AGRICULTURE

Proportion of the Total Population

By Sex

	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Center	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Manufacturers	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Knox	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Chellington	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Charon	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Rushmore	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Grand Trunk	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Richards	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Colrain	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Island	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Magdalen	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Mullin	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Syde	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
St. Charles	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
St. Peterpool	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Boz	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Chelvoix	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Butler	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65
Chateaugay	171	0216	1224	2600	52	56	10320	13	3	4	5	6	37	22	1647	107	32	65

Total

St. Gabriel W'd.

Total

No. 10 Cont'd.—Schedule showing the Pipes, Hydrants, Valves, Services, &c., laid in the City of Montreal during the year 1892

WARDS.	LENGTH IN FEET OF CAST IRON PIPES.								No. OF VALVES.								TOTAL.		Wrought Iron Pipe.	Hydrants.	Length of Lead Pipes in feet.	Houses Supplied.	Brass Cocks.	Air Cocks.	
	TOTAL																								
	24"	20"	16"	12"	10"	8"	6"	4"	39"	24"	20"	16"	12"	10"	8"	6"	4"								
East.....	1650	.....	.....	4	.....	5	2	39	1694	.....	1	.....	1	.....	5	1	4	12	.....	2	174	10	2	8
Centre.....	675	.....	.....	3	362	78	.....	69	1387	.....	.....	.....	.....	2	.....	.....	4	6	.....	4	81	5	2	1
West.....	.....	.....	.....	.....	.....	.....	.....	27	27	.....	.....	.....	.....	.....	.....	.....	1	1	29	.....	22	3	1	1
St. Ann.....	.....	.....	7098	2992	3398	190	213	13891	.....	.....	.....	.....	13	12	14	2	12	35	.....	35	1554	84	15	68
St. Antoine.....	47	.....	3005	2875	1543	118	387	7925	1	1	.....	.....	9	6	8	1	14	40	.....	19	5459	249	61	181
St. Lawr.....	3012	.....	2621	1783	754	40	60	8270	.....	.....	3	.....	5	3	10	2	11	34	.....	18	7813	393	91	332
St. Louis.....	1516	1848	2598	303	1620	41	101	8027	.....	.....	1	2	8	8	3	3	6	31	.....	13	4196	206	89	116
St. James.....	.....	.....	542	896	8997	485	103	11005	.....	.....	.....	.....	4	1	16	1	6	28	.....	28	8630	412	100	313
St. Mary.....	.....	.....	270	3459	450	247	148	4576	.....	.....	.....	.....	1	3	1	3	6	14	.....	11	6132	343	79	262
St. J. Bte.....	202	3059	.....	.....	.....	89	8	3358	.....	.....	.....	.....	7	.....	1	.....	.....	8	.....	4	4547	284	43	241
Hochelega.....	171	.....	6219	1224	2598	52	56	10320	.....	.....	.....	.....	12	3	4	2	5	27	.....	22	1847	107	22	85
St. Gabriel.....	.....	.....	.....	.....	.....	592	.....	6	598	.....	.....	.....	.....	.....	1	.....	.....	1	.....	1	5334	257	34	223
	2496	4575	2050	25401	13994	20125	1183	1103	70977	1	2	4	2	60	38	63	15	70	255	29	157	45789	2353	539	1891

SCHEDULE No. 10.—SHOWING THE PIPES, &c.—Continued.

Name of Ship	No. of Valves.	Length of Iron Pipes	Weight of Pipes	Length of Lead Pipes	Weight of Lead Pipes	Length of Lead Pipes in Port	Losses supplied.	Lead rocks	Air rocks.
23. <i>John</i>	254	4100	212	1000	2400	2400	1000	1000	1000
24. <i>John</i>	150	26	1516	14862	12400	12400	1000	1000	1000
25. <i>John</i>	200	4300	1074	14300	7511	10815	28750	36781	114550
26. <i>Mary</i>	250	7064	100	10042	10050	6168	47400	32207	132034
27. <i>J. Hopt</i>	100	202	10103	300	7453	20000	15	51102	62204
28. <i>Hocheberg</i>	100	13034	8450	6423	13730	10000	16357	1017178	1017178
29. <i>Gabriel</i>	112	2126	498	36	5499	7407	517	1017178	1017178
30. <i>Total</i>	1000	33100	18010	8794	100023	116320	74873	245040	316200
31. <i>King Molen</i>	100	27709	1674	15	5484	7732	1017178	1017178	1017178
32. <i>Exhib. Ord</i>	100	27709	1674	15	5484	7732	1017178	1017178	1017178
33. <i>G. T. R. P.</i>	100	27709	1674	15	5484	7732	1017178	1017178	1017178
34. <i>Grand total.</i>	1000	33100	18010	8794	100023	116320	74873	245040	316200

**SCHEDULE.—PIPES, ETC., ABANDONNED DURING THE
YEAR 1892.**

NAME OF STREETS.	CAST IRON PIPES IN FEET.			VALVES			Hydrants.
	6"	4"	Total.	8"	6"	4"	
aptiste.....		462	462		2		1
.....		915	915		1		1
.....	1592		1592		1		3
.....		1030	1030		1		
.....		810	810		1		
.....	1164	850	2014		2	1	1
.....		1480	1480		1		2
.....		159	159		1		
.....		28	28		1		
on.....	600	663	1263				1
.....	1062		1062		3		1
.....		987	987				
.....		590	590		1		2
.....		582	582		1		1
.....		450	450				
.....		560	560				1
.....		265	265		1		
.....		5125	5125		3		2
.....		1344	1344				
rtier.....		1580	1580		3		2
ère.....	65		65				
.....		324	324		1		1
ie.....		720	720		1		
.....	120		120		2		
.....		1747	1747				3
.....					2		
ve.....		24	24		1		
.....		20	20		1		
.....		88	88		1		
.....		1207	1207		1		3
.....					1		1
.....	35		35		1		
v.....		3408	3804				
.....				1			
	4638	25418	30056	1	12	24	26

No. 11—Schedule showing the Pipes, Hydrants and Valves laid down and the number of Houses supplied with water in the City of Montreal up to 1st January 1893.

[illegible]

No. 13.—SCHEDULE.

THE POSITION OF PUBLIC FOUNTAINS ERECTED IN CITY OF MONTREAL,
UP TO JANUARY 1893.

LOCATION.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains	Cast Iron Fountains.	Wood Fountains.	Cast Iron Drinking Troughs	Number of Jets.
er Hall Square.....				1			1
Rive Park.....	1			1			2
ecours Market.....							2
oillez Square.....						1	1
rier Square.....				2		1	6
orne at Flour Shed.....				1			2
House Square.....	2	1	2				5
at Victoria Square.....			1				2
opposite Drill Hall.....				1		1	1
im House Square.....				1		1	1
vester at Dominion Square.....				1		1	1
rin Square.....				1			1
rd near Notre-Dame St.....						1	1
ault & St. Lawrence St.....				1		1	1
ies Cartier Square & St. Paul St.....	1			1		1	5
ctors St. at Hay Market.....						1	1
vish St. opposite Reservoir.....				1			1
ll & Common St.....			1			1	2
st. at Waste Weir.....					1		2
t Royal Avenue.....						1	1
-Dame St. near Ruisseau Migeon.....						1	1
-Dame St. and Poupart.....				1		1	1
io St. opposite Reformatory Gronds..					1	1	2
io near Papineau Av.....						1	2
7a corner Dalhousie.....						1	2
eau Av. North of Sherbrooke.....					1	1	2
eau Square.....		1			1	1	7
Av. & Duluth Avenue.....						1	2
ps Square.....				1			1
ps Square & St. Catherine St.....						1	1
e & Common St.....				1		1	1
el & Champlain St.....				1		1	1
ond Square.....				1		1	1
eurs & William St.....				1		1	1
rooke near Drummond St.....		1					2
rooke corner Guy.....		1					2
in's Market.....						1	2
toine Market.....				1		1	2
atherine & Western Park.....						1	2
atherine & Delorimier.....					1	1	2
ibriel Market.....					1	1	2
uis Square.....	1			2			9

No. 13.—SCHEDULE.—Continued.

No.	LOCATION.	Cast Iron Basins.	Stone and Cement	Stone Fountains	Cast Iron Fountains.	Wood Fountains	Cast Iron Drinking Troughs	Number of Jets.
43	St. Patrick & Richmond St.....	.....	.....	.....	1	.....	1	1
44	St. Patrick & Napoléon Road.....	.....	.....	.....	1	.....	1	1
45	St. Patrick & Wellington St.....	.....	.....	.....	1	.....	1	3
46	St. Thomas & Ottawa St.....	.....	.....	.....	1	.....	1	1
47	Victoria Sq. South of Craig St.....	.....	1	2	.....	.....	.....	6
48	Victoria Sq. North of Craig St.....	3	.....	.....	.....	.....	.....	4
49	Viger Sq. Basin No. 1.....	.....	1	.....	.....	.....	.....	1
50	Viger Sq. Basin No. 2.....	3	.....	.....	.....	.....	.....	9
51	Viger Sq.....	.....	.....	.....	1	.....	.....	2
52	Wellington & Centre St.....	1	.....	.....	.....	.....	.....	3
53	Wellington & Magdalen St.....	.....	.....	.....	1	.....	1	1
54	Western Park.....	2	1	.....	.....	.....	.....	5
55	St. Patricks Square.....	2	.....	.....	.....	.....	.....	2
56	Dalhousie Square.....	2	.....	.....	.....	.....	.....	1

No.	LOCATION.	Road Watering Nozles.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Cattle Drinking Troughs	Number of Jets.
Distributed through Mountain Park.						
1	High Level Reservoir.....	.....	1	.....	.....	1
2	Foot of Elevator.....	.....	1	.....	1	1
3	Alongside Molson's Fence.....	.....	.....	1	.....	1
4	Above Golf Club House.....	.....	.....	1	.....	1
5	Park Road, North of Elevator.....	3	10	.....	.....	3
6	Park Road, running West side of Hall's property...	.....	.....	1	.....	1
7	Park Av. opposite Duluth Avenue.....	1	.....	.....	1	2

No. 13—SCHEDULE.—*Continued.*

LOCATION. Distributed along the Wharves.	Road Watering Nozzles.	Cast Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals	Number of Jets.
Wind-Mill Point.....		6	1	1	1	3
Allan's Wharf.....		1				2
Allan's Sheds.....				1		2
Opposite Custom House.....					1	2
King's Basin.....		1				1
Dominion Line.....				1	1	3
Foot of Jacques Cartier Square..		1				1
Foot of St. Gabriel St.....		1				1
St. Helen's Island Ferry.....						1
Beaver Line.....			1	1	1	3
Donaldson Line, foot of Grant St.....					1	1
Commissioners, East of Berri.....		1				1
Longueuil Ferry.....						1
Foot of Marlborough St.....					1	2
Foot of Dezery St.....					1	2
West of Gale St.....					1	2

Wages to Agents	111 42
Office	40 00
	<hr/>
	151 42

No. 14 SCHEDULE.—*Continued.*

DETAILED STATEMENT OF EXPENDITURE UP TO 31ST DECEMBER 1892.

PIPE TRACK.

	Spent.
Repairs to valves and valve chambers.....	\$ 271 93
30" pump'g main	1508 46
	<hr/>
	1780 39

ENGINE HOUSE LOW LEVEL.

Repairs to boilers.....	237 02
“ machinery.	166 54
Staff.....	3800 00
Wages.....	5178 78
Coal for steam.....	15352 05
Rent for land.	50 00
Telephone service.....	53 00
Supplies.....	690 13
Sundries.....	81 93
Repairs to buildings.....	18 18
	<hr/>
	25627 63

RESERVOIRS.

Guardian McTavish Reservoir ($\frac{1}{2}$ of salary).....	400 00
Watchman H. L.	602 35
Shoveling snow.....	39 21
Valve house.....	6 15
Small boat.....	25 00
Arc light.....	178 04
Telephone service.....	27 40
Sundries	140 62
	<hr/>
	1418 77

ENGINE HOUSE HIGH LEVEL.

Wages.....	1883 02
Fuel for engine.....	4954 58
Supplies.....	269 09
Repairs to buildings.....	43 12
“ machinery and boilers.....	243 10
Light and telephone.....	99 19
	<hr/>
	7492 10

WORKSHOP LAGAUCHETIERE ST.

Wages.....	10446 94
Iron, spikes, &c.....	323 77
Rent of foreman's house.....	200 00
Telephone service.....	99 90
Fuel and light.....	678 26
Repairs to buildings.....	142 16
“ carpenter's shops and stables	15 79
	<hr/>
	11906 82

No. 14 SCHEDULE—*Continued.*

DETAILED STATEMENT OF EXPENDITURE UP TO 31ST DECEMBER 1892.

DISTRIBUTION PIPES.

	Spent.
Repairs to mains, services and valves : wages.....	\$31520 40
Thawing pipes and carting water.....	535 34
Inspecting service pipes inside of houses.....	7814 49
Dress for inspectors.....	471 45
Repairs to footpaths and services : wages.....	7178 04
Materials : Iron castings, lead, tin, &c.....	1259 65
“ Wood, planks, nails, &c.....	714 23
“ Brick, cement, sand, drain pipes, &c.....	13 75
Alarm signals.....	
	<hr/> 49507 55

METER DEPARTMENT.

2 Meter inspectors and car fare.....	2484 99
Testing, placing and repairing meters.....	2818 90
New meters.....	2152 50
Repairs to building.....	5 00
	<hr/> 7462 29

PUBLIC FOUNTAINS.

Repairing : wages.....	1589 71
Repairing : materials.....	132 94
New troughs.....	
	<hr/> 1722 65

HYDRANTS.

Inspecting : wages.....	11967 46
Repairing : wages and materials.....	4069 95
Thawing : horses and laborers.....	1068 92
Rent of tap house, St. Jean Bte. ward.....	97 07
	<hr/> 17203 40

MISCELLANEOUS.

Contingencies for office, drawing paper, &c., ink colours, instruments, &c.....	1063 29
Water analysis.....	89 10
Horse keep superintendent.....	400 00
do foreman.....	350 00
Damages.....	1355 23
School taxes and assesment outside municipalities.....	534 09
	<hr/> 3791 71

NO. 14 SCHEDULE.—Continued.

LIST OF EXPENDITURE UP TO 31ST DECEMBER 1892.

WORKSHOP IN ST. GABRIEL WARD.

Spent.

\$	3087	36
	50	00
	112	32
	45	57

3295 75

SHOP IN ST. JEAN BAPTISTE WARD.

	2396	96
	18	05
	50	00
	46	31

2511 32

SHOP IN HOCHELAGA WARD.

	1043	66
	24	25
	55	80

1123 71

STAFF.

	8500	00
intendent.....	2000	00
	1200	00
	624	00
	1000	00
retary.....	900	00
ief inspector.....	900	00
	624	00

10747 00

LOANS

PIPE LAYING.

	136567	66
inc, &c.....	10436	80
	8789	08
ass works.....	11615	91
rd wood, &c.....	3328	47
nd, clay, drain pipes, lime, &c.....	3006	22
stings.....	37522	74
&c.....	4871	40
	2304	94
pipes.....	118239	44
iron pipes.....	347	32

Carried\$337029 98

.....	4
..... Ward	3
.....	2

INVENTORY.

SCHEDULE No. 15.—INVENTORY OF STOCK ON HAND, JANUARY 1893.

DESCRIPTION.	30"	24"	20"	16"	12"	10"	8"	6"
Cast iron pipes (new) in feet	96	564	516	624	7632	24	168	1701

DESCRIPTIONS.	30"	24"	20"	16"	12"	10"	8"	6"	4"	3"
Cast iron pipes (old) feet..	0	0	0	0	0	0	0	0	288	0
Stop valves.....	0	1	0	3	4	4	9	6	6	15
Slip sockets.....	1	34	3	25	22	10	14	18	73	11
Cast iron caps.....	3	11	17	12	89	65	117	47	57	30
Cast iron plugs.....	2	9	15	13	47	42	57	183	151	0
Cast iron double bends.....	0	0	0	0	15	2	27	21	33	0
Cast iron bends $\frac{1}{2}$	1	4	6	9	19	21	40	50	68	0
Cast iron bends $\frac{3}{4}$	0	0	0	0	37	14	0	0	3	0
Cast iron sweeps.....	0	0	0	0	2	6	0	1	0	0
Radial sockets.....	17	14	13	18	59	38	62	0	0	0

CROSSES.

30 x 24	30 x 20	30 x 12	30 x 6	30 x 4	24 x 24	24 x 16	24 x 12	24 x 8	20 x 16	20 x 12
1	2	7	2	1	6	4	5	2	1	5

16 x 16	16 x 12	12 x 12	12 x 10	12 x 8	12 x 6	12 x 4	10 x 10	10 x 8	10 x 6	10 x 4
3	8	49	12	16	13	4	11	33	11	6

8 x 8	8 x 6	8 x 4	6 x 6	6 x 4	4 x 4	4 x 3	3 x 3	8 x 8
38	13	12	16	11	8	7	5	38

TEES.

30 x 24	30 x 6	30 x 10	30 x 4	24 x 24	24 x 12	24 x 8	24 x 6	24 x 4	20 x 12
2	7	2	6	2	1	8	8	16	18

20 x 8	20 x 4	16 x 12	16 x 10	16 x 8	16 x 6	12 x 12	12 x 10	12 x 8	12 x 4	10 x 10
2	5	13	20	3	2	16	21	40	10	17

SCHEDULE No. 15.—INVENTORY.—Continued.

STATEMENT SHOWING STOCK ON HAND DECEMBER THE 31st 1892.

TEES.

10 x 8	10 x 6	10 x 4	8 x 8	8 x 6	8 x 4	6 x 6	6 x 4	4 x 4
42	5	3	19	20	7	3	8	3

TAPERS.

30 x 24	24 x 20	24 x 16	20 x 16	20 x 12	16 x 12	12 x 10	12 x 8	12 x 8	12 x 6	10 x 8
7	4	3	9	3	8	3	16	41	22	48

10 x 6	10 x 6	10 x 4	8 x 6	12 x 4	6 x 4	4 x 3	4 x 2½	4 x 2	4 x 1½	3 x 2½
10	24	20	5	9	48	5	14	8	12	1

3 x 2	3 x 1½	2½ x 2	2½ x 1½	2 x 1½
14	11	11	11	12

BREECHES.

30 x 24	30 x 30	24 x 24	20 x 20	16 x 16	12 x 12	10 x 10	8 x 8	6 x 6
1	2	3	2	3	7	7	7	3

CASTINGS FROM 3" TO 1½"

GROSSES

3 x 3	3 x 2½	3 x 2	3 x 1½
12	11	12	12

ELBOWS (SQUARE)

ELBOWS ½ SWEEP

3"	2½"	2"	1½"	3"	2½"	2"	1½"
24	26	37	6	24	26	54	1

No. 15 SCHEDULE.—INVENTORY.—(Continued.)

STATEMENT SHOWING STOCK ON HAND DECEMBER THE 31ST 1892.

CASTINGS FROM 3" TO 1½"

DOUBLE BENDS				BONNETS		
3"	2½"	2"	1½"	3"	2½"	2"
6	6	6	6	2	16	15

PLUGS				SOCKETS			
3"	2½"	2"	1½"	3"	2½"	2"	1½"
23	17	17	33	48	54	47	42

hydrants (5 noz.).....	46	Street watering nozels (brass).....	675
iron fender posts.....	2	Hydrant nozels (brass).....	40
rted valve covers.....	134	Assorted spindles.....	85
rants already used.....	7	Rods for stop-cocks assorted.....	92

neumatic stop cocks.....	14	2" iron pipe in feet.....	10
" ".....	17	1½" " ".....	30
" ".....	172	1" " ".....	100
y " ".....	7	281 rolls of 1" lead pipe, weight.....	67,446
" ".....	85	" of ½" " ".....	1,100
" ".....	12	483 " of ½" " ".....	70,518
round cocks.....	128	Lead (pig) in lbs. 259 bars.....	25,900
" ".....	42	Tin (ingot) in lbs.....	100
" ".....	3	½" copper tubing in lbs.	2,610
nozels.....	19	½" iron boxes.....	20
".....	81	Footpath plates complete.....	635
".....	69	Cast iron caps for tube boxes	198
½" tees.....	9		
s.....	31		
orted covers for boxes	41		

JOHN FALLON,
Foreman at Shop.

Rate.	Assessed.	Tenanted	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.
\$ 4 00	1243	1127	116	\$	8015	7298	717
5 00	888	815	73	36 00	10	9	1
6 00	1592	1439	153	38 00	59	57	2
7 00	461	419	42	39 00	1	1	1
8 00	589	509	80	40 00	2	2	2
9 00	188	179	9	41 00	2	2	1
10 00	744	666	78	42 00	111	108	3
11 00	80	78	2	46 00	24	23	1
12 00	337	309	28	48 00	1	1	1
13 00	65	62	3	50 00	60	55	5
14 00	403	368	35	52 00	2	2	2
15 00	20	19	1	54 00	23	23	1
16 00	165	162	13	55 00	1	1	1
17 00	32	31	1	56 00	1	1	1
18 00	310	275	35	58 00	26	26	1
19 00	3	3		62 00	41	40	1
20 00	129	123	6	64 00	1	1	1
21 00	8	8		66 00	24	22	2
22 00	227	208	19	70 00	5	5	1
23 00	1	1		74 00	30	30	1
24 00	54	51	3	78 00	1	1	1
25 00	4	4		79 00	1	1	1
26 00	189	181	8	80 00	1	1	1
28 00	48	47	1	82 00	39	39	1
29 00	1	1		86 00	2	2	1
30 00	81	78	3	90 00	10	10	1
31 00	6	6		94 00	1	1	1
32 00	22	22		98 00	11	11	1
33 00	1	1		102 50	14	14	1
34 00	124	116	8	106 00	2	2	1
Total.	8015	7298	717		8521		

No. 16 SCHEDULE.—*Continued.*

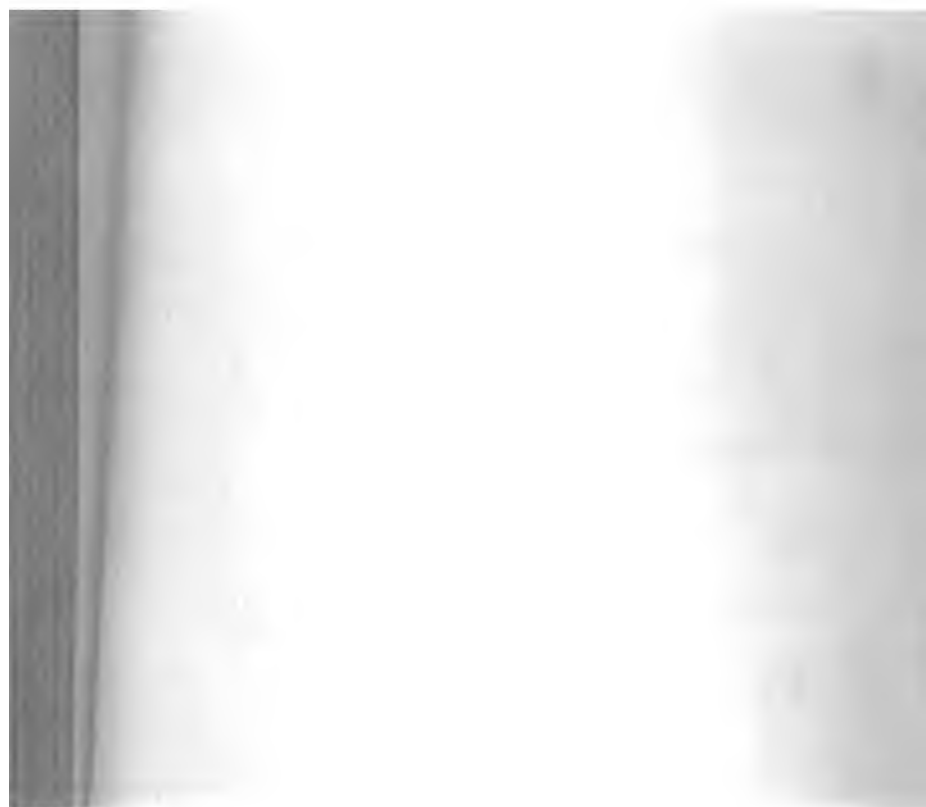
STATEMENT OF ARREARS ON WATER RATES.

	Balance due on 1st January 1892.	Collected in 1892.	Written off in 1892.	Outstanding balance on 1st January 1893.
	\$ c.	\$ c.	\$ c.	\$ c.
previous..	29037 52	.....	.....	29037 52
" ..	14688 63	.....	.....	14688 63
" ..	22766 63	.....	.....	22766 63
" ..	31835 06	.....	.....	31835 06
" ..	21308 26	.....	.....	21308 26
" ..	35166 57	.....	.....	35166 57
" ..	45123 35	.....	.....	45123 35
" ..	51176 20	305 54	.....	50870 66
" ..	74247 36	4164 88	.....	70082 48
" ..	146166 57	71616 34	.....	74550 23
	<u>471516 15</u>	<u>76086 76</u>	<u>.....</u>	<u>395429 39</u>

MISCELLANEOUS:

Building purposes	\$ 2702 28
Hose licences	888 00
Water sold in St. Jean Bap'te ward..	91 26
Special items	1813 51
Various.....	519 13
Total	<u>6014 18</u>

[illegible]



W. Baker 1894

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER 1893

PRINTED BY ORDER OF THE WATER COMMITTEE.



12-28-94-"Water".

Montreal

EUSÈBE SENÉCAL & FILS. PRINTERS,

20, ST. VINCENT STREET,

1894

V1

1894

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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS
FOR THE
YEAR ENDING 31st DECEMBER 1893.

WATER WORKS OFFICE. CITY HALL
Montreal.

To the

Mayor, Aldermen and Citizens of the City of Montreal.

GENTLEMEN,

I have the honour to present you with the report of the operation of the Water Department for the year ending 1893.

The general condition of the works and the important improvements and repairs required in the future, the subject being as follows :

1. Aqueduct.—2. Low Level Pumping Station, with its Pumping Machinery. 3. Machine Shop and Foundry. 4. Tail Race. 5. Pipe Track and Pumping Mains. 6. Reservoirs. 7. High Level service. 8. Pipe Laying. 9. Maintenance of Distribution and Service Pipes, Hydrants and Fountains. 10. Consumption of Water. 11. Meters and House to House Inspection. 12. Administration. 13. General Remarks. An appendix comprising reports from the Assistant Superintendent and other officials of the Department, together with tabular statements showing works that have been done during the year, and money expended, and giving useful information, is also attached.

I have to state that during the year of 1893 a large number of changes have been made in the way of improvements in the services in various ways. A large number of pneumatic cocks which have been giving considerable trouble and causing a large amount

IV

of expense, have been taken out, to the number of 152 and improved hydrants have also been put in to the number of 120. During the whole of the winter which was very severe, not one of those were found frozen. They are thoroughly frost proof and will require no inspection, which is a very expensive item, during the winter particularly.

We have obtained also by a Resolution of the Finance Committee, a new 10,000,000 gallon Worthington Pumping Engine, from the Worthington Co., at a cost of \$55,000 delivered on foundation. This engine will be erected and completed for operation in the course of the beginning of the year 1894. A battery of three new Heine boilers will also be erected in the middle space of the boiler house to replace three old Lancashire boilers, now condemned, which will add considerable safety to our pumping capacity during the winter.

AQUEDUCT.

I regret to say that the Aqueduct retaining angle wall at the entrance was reported in my last report as in great need of extensive repairs. I recommended the purchase of 3 acres of water frontage from the opening of Aqueduct West, so that it may be fenced in from the public highway and that an additional angle wall be built out in the River to divert the water that sweeps the river shore, from Lachine down, from passing into the Aqueduct and driving it past the end of the present retaining wall down the river. Likewise I reported on very extensive system of ditches to carry surface water away, and to prevent the farms along the line of the Aqueduct from being damaged by water during heavy rain falls in the spring and fall. All the bridges crossing the Aqueduct require repairs, viz 12, 13, 14, and 15 should have been renewed with iron girders, and all the others should also have been replaced with girders, say 2 per annum, after the first four have been renewed.

The pier of the stone bridge now standing in the middle of the Aqueduct should be removed at once, but I regret having to state that no appropriation of money was allowed during the year to do any of the above mentioned work, consequently they have remained in the same condition that they were in the year previous, only some of the worst bridges have deteriorated so that they are now dangerous to make use of. I am in hopes that the year 1894 will bring forth the necessary money to repair all the above mentioned bridges and retaining angle wall, to prevent very heavy expenses being incurred later on, as they are so delapidated that renewing them will certainly have to be carried out in the near future.

I am pleased to say that the Council granted an appropriation of \$16,453.00 for a new independent suction pipe as per my report of the previous year, from the Aqueduct to the wells of the pumping engines which will be put in the spring of 1894, thus giving the facility of shutting off by log gates the Settling Pond, so that repairs can be operated, likewise the cleaning of the same, and during which time the City can be supplied with water direct from the Aqueduct without interruption.

2. LOW LEVEL PUMPING STATION WORKS.

No 1 Turbine is in fair condition of repairs, so that little expense was incurred on this turbine during the year, and is considered in rather good condition now. The interior of the building in this No 1 turbine space, has received some repairs and renovating.

No 2. The old Breast Wheel which I condemned in August 1892, on my assuming the position of Superintendent of this Department, I am glad to say has been removed, and the Council have granted \$22,078.00, acquiescing to my report asking to have it replaced by a first class economical pair of Worthington Double acting Plunger pumps, driven by a double turbine wheel of the most improved pattern laid on horizontal shaft. These will also be put into operation during the year 1894, thus giving a capacity of 5,000,000 gallons per 24 hours, that will be pumped free of fuel cost.

No 3 Turbine is in fair condition, but will require some repairs at a very early date, it is of the oldest type and requires frequent repairs, consequently it is not at all economical to run, and should be replaced at an early date by a similar one to the one mentioned above.

No 4 Turbine is likewise in fair order, but of the same wasteful type so that this pair of wheels, Nos. 3 & 4 are under the same condition and fill the space that should be taken up by a pair of wheels and pumps that would make the machinery uniform and economical under the same roof of building and under the same condition.

No. 1 Steam Pumping Engine. This engine has worked well during the whole year, and performed heavy duty on account of the early closing down of the pumping turbines, the cause of extensive cold and under an increased consumption of water, rendering the necessity of running both Nos. 1 & 3 night and day constantly. Very little repairs have been done to this engine.

No. 3 Engine also worked well with very little repairs.

The new 10,000,000 pumping engine purchased, as mentioned in the opening of this report, will arrive and be erected on its foundation in the early part of the coming year, which will give the

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required capacity as reported and requested in my report of last year, while the new battery of boilers will likely be purchased during the coming year and put into operation.

The work turned out during the year from the machine shop at the wheel house is as follows :

8	3	nozzel hydrants new style.
42	5	" " old "
46	5	" " new "
20	4"	valves old style.
7	6"	" "
64	8"	" "
7	10"	" "
18	12"	" "
16	4"	valves new style.
21	8"	" "
8	10"	" "
24	12"	" "
35	4"	new valve spindles
14	6"	" "
2	12"	" "
10	12"	" nuts.
20	12"	" washers.
6		Glass water gauges mountings
6		Top nuts for 3 nozzel hydrants.
6		" 5 "
8		Air cocks for No. 1 wheel pump chests.
957	1"	Stop cocks.
482	1"	Ditto.
1838	1"	Couplings.
2229	1"	Ditto.
326	1"	Pneumatic stop valves.
86	1"	Ditto.
1613	1"	Nozzels.
75	1"	"
75	1"	Couplings.
12	1" x 4 $\frac{1}{2}$ "	Studs
12	1" x 4 $\frac{1}{2}$ "	"
6	1" x 14"	"
12	1" x 4"	"
6	1" x 14"	"
24	1 $\frac{1}{2}$ "	Meter couplings.
385	1"	Service caps.
36		Watering nozzels.
204	1" x 1 $\frac{1}{2}$ "	Reducing couplings.

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- 1 Drift for water meter.
- 2 Large brass nozzels for 5 nozzel hydrant.
- 986 Tube caps.
- 572 Union couplings.
- 320 Pointed ends.
- 812 Round ends.
- 450 Square ends.
- 554 Nipples.
- 12 2" Brass plugs.
- 3 4" Valve glands.
- 2 Pieces for lathe.
- 37 $\frac{5}{8}$ Steel nozzel drills.
- 1 Spindle for lathe.
- 1 12" valve stuffing box.
- 4 Bolts and nuts for same.
- 65 Brass wire springs Eng. No. 1.
- 1 Piece casting drilled St. Chas. B. Shop.
- 1 Brass screw for counter H. L. P. S.
- 2 Pieces 12" pipe flanged for 12" valve.
- 4 Bolts and nuts for same.
- 6 Nuts and 6 washers for 5 nozzel hydrant.
- 12 $\frac{5}{8}$ nuts for 5 nozzel hydrant.
- 43 Hydr. brass sockets.

REPAIRS

- 1 5 Nozzel hydr. foot valve turned anew and sludge cock changed.
 - 1 5 Nozzle hydr. furnished with new valve and piston.
 - 10 5 " " " wth new brass sockets.
 - 13 3 " " " " "
 - 20 2 " " " " "
 - 1 Force pump.
 - 1 Screwing machine.
 - 1 Globe valve furnished with new spindle.
 - 9 Old style 4" valves " " "
 - 1 " 6" " gate faced anew.
 - 1 " 5" " furnished with new nut and spindle.
 - 1 Lead pipe flanging machine.
 - 2 Footpath augers.
 - 1 Air pump bucket.
 - 1 Steam valve gland.
 - 1 Boiler feed pump.
 - 1 2" Globe valve furnished with new brass spindle.
 - 1 Stop valve.
 - 23 Fire irons.
- Brass castings delivered from Foundry during the year
21,554 $\frac{1}{2}$ lbs.

THE

The report of Mr. Tamm, Chief Engineer in charge of the
San Francisco Waterworks, is submitted herewith. The report
of Mr. Tamm, Chief Engineer in charge of the San Francisco
Waterworks, is submitted herewith.

A. TAIL RACE

My report of last year on the Tail Race, remains almost the
same as regards expense, with the exception that report of the
San Francisco Waterworks, is submitted herewith. The report
of Mr. Tamm, Chief Engineer in charge of the San Francisco
Waterworks, is submitted herewith.

B. PIPE TRENCH AND TUNNEL

The plan of the Tail Race, shows the water flowing down hill as the
tail race is to connect the dam at the High Level with the
tail race at the foot of the dam. The High Level of the City, as
the water flows down hill, will be connected to the High
Level of the City, as the water flows down hill. The High
Level of the City, as the water flows down hill, will be
connected to the High Level of the City, as the water flows
down hill. The High Level of the City, as the water flows
down hill, will be connected to the High Level of the City,
as the water flows down hill.

I mentioned in my last report the 20" and 24" pipe
trenches were laid in the tail race. The pipe is a small
diameter pipe, and it is not possible to get it into the tail
race. The pipe is a small diameter pipe, and it is not possible
to get it into the tail race. The pipe is a small diameter pipe,
and it is not possible to get it into the tail race. The pipe is
a small diameter pipe, and it is not possible to get it into the
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connected to the High Level of the City, as the water flows
down hill. The High Level of the City, as the water flows
down hill, will be connected to the High Level of the City,
as the water flows down hill.

C. RESERVOIRS

The McTear Reservoir, as reported in my last report,
very extensive repairs. The reservoir is becoming even more
shattered by the pressure of ice, and the leaks being at the rate of

IX

300,000 gallons per hour, or even more, through the cross wall. The top layer of stone coping requires to be removed and sections of this cross wall should be rebuilt piece by piece so as to avoid a large outlay at first, and to prevent the shutting off completely for any length of time. The valves are also in the same condition and require extensive repairs. In fact the entire report made last year has to be repeated this year, as no means were granted to carry out the repairs asked for.

7. HIGH LEVEL SERVICE.

The pumping engine is getting into worse order day by day, likewise the boilers in their expensively set condition, are becoming more wasteful. The Engineers dwelling is also in great need of repairs. The fences around the Reservoir are tumbling down and no means afforded for their maintainance. Coal shed as reported last year, is too small, a large amount of last year's coal has to be left out exposed to the snow and cold, so that at least from 10 oyo of its actual value is wasted of account of its being so exposed.

8. PIPE LAYING.

The total length of cast iron pipes laid during the year 1893, is as follows, 54,455 feet, equal to 10.31 miles, the weight of metal meing 2,279.11 tons. The different sizes of pipes laid, their lengths and weights, and the number of valves of different sizes put in, are as follows :

Sizes.	Length in feet.	Weight in tons.	Number of valves.
24	3527	434.70	3
20	26	1.33	1
16	2278	155.06	2
12	23260	1048.77	64
10	1979	61.58	19
8	21230	548.13	99
6	865	15.20	13
4	1290	14.34	55
<hr/>			
Total.....	54,455	2279.11	246

9. NEW HYDRANTS, Etc.

New 5 nozzle hydrants put in during 1893.....	113
(Including 29 hydrants of the latest improvements)	
New 2 nozzle hydrants put in during 1843.....	7
<hr/>	
Total.....	120

Responsible persons are:

Reel vertical axis in 1881 _____ 150
Length of reel pipe in feet. Reel vertical axis in 1881 _____ 150

FIGURE 10. FALCON LAKE OF 10 JANUARY 1964.

Year	Value	Value
1987	25,000	100
1988	42,000	168
1989	10,000	40
1990	11,000	44
1991	22,000	88
1992	12,000	48
1993	14,000	56
1994	14,000	56
1995	14,000	56
1996	14,000	56
1997	14,000	56
1998	14,000	56
1999	14,000	56
2000	14,000	56
2001	14,000	56
2002	14,000	56
2003	14,000	56
2004	14,000	56
2005	14,000	56
2006	14,000	56
2007	14,000	56
2008	14,000	56
2009	14,000	56
2010	14,000	56
2011	14,000	56
2012	14,000	56
2013	14,000	56
2014	14,000	56
2015	14,000	56
2016	14,000	56
2017	14,000	56
2018	14,000	56
2019	14,000	56
2020	14,000	56
2021	14,000	56
2022	14,000	56
2023	14,000	56
2024	14,000	56
2025	14,000	56
2026	14,000	56
2027	14,000	56
2028	14,000	56
2029	14,000	56
2030	14,000	56
2031	14,000	56
2032	14,000	56
2033	14,000	56
2034	14,000	56
2035	14,000	56
2036	14,000	56
2037	14,000	56
2038	14,000	56
2039	14,000	56
2040	14,000	56
2041	14,000	56
2042	14,000	56
2043	14,000	56
2044	14,000	56
2045	14,000	56
2046	14,000	56
2047	14,000	56
2048	14,000	56
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2052	14,000	56
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2064	14,000	56
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2066	14,000	56
2067	14,000	56
2068	14,000	56
2069	14,000	56
2070	14,000	56
2071	14,000	56
2072	14,000	56
2073	14,000	56
2074	14,000	56
2075	14,000	56
2076	14,000	56
2077	14,000	56
2078	14,000	56
2079	14,000	56
2080	14,000	56
2081	14,000	56
2082	14,000	56
2083	14,000	56
2084	14,000	56
2085	14,000	56
2086	14,000	56
2087	14,000	56
2088	14,000	56
2089	14,000	56
2090	14,000	56
2091	14,000	56
2092	14,000	56
2093	14,000	56
2094	14,000	56
2095	14,000	56
2096	14,000	56
2097	14,000	56
2098	14,000	56
2099	14,000	56
2100	14,000	56

二、研究

1. 2. 3. 4. 5.

U.S. DEPARTMENT OF DEFENSE
OFFICE OF THE SECRETARY

The above information was obtained from the following sources:

A large, rectangular object, which during the year of any one opening, was kept open to the 24" main on Notre-Dame street, near Papineau square, which gave way about 17 days after it had been set in place in a thin place 27" long by 14", about the middle of the pipe, which seems to have been suddenly chilled by some unknown cause during its construction.

11. CONSUMPTION OF WATER.

The quantity of water pumped during the year 1893, is 6,352,735,336 gallons, or a daily average of 17,404,754 gallons, an increase of 2,927,370 gallons daily over 1892. Average water pumped by water wheels per day 8,117,407 gallons. Average water pumped by steam pumping engines per day 9,287,347 gallons. No. 5 tableau shows all averages.

12. ADMINISTRATION.

Schedule 14 gives the details of the year's expenditure for maintenance, as well as for permanent improvements. The former amounts to \$163,997.00 the latter amounts to \$266,796.92, taken from loans and is principally for pipe laying.

13. GENERAL REMARKS.

The regulations in the administration of the Department which I prepared in my last report to have changed, have been carried. The efficient working of the office and a clearer record of the registering of all documents received both for the Water Committee and the correct management of the Department has been carried out. Also a system in finding all the service cocks, which have had to be carried out by a special house to house inspector and service to service, finding and measuring and, registering, in order to complete the new maps, showing the exact locality of each water service, given per measurement and per number of street and per name of street, has been nearly completed. When it is finished a key book will be compiled which will facilitate the finding of each service by any ordinary hand, to turn on and off the water, without the necessary expense as has been in the past, of having to hunt round and dig at many places, particularly in winter, when a leak took place from the bursting or breakage of a service pipe causing damages by water running into cellars etc. I am happy to say that this class of expense has been reduced very much and will in due time completely disappear, when all the proper service pipes, and new system, stronger and better material in both water cock pipes and boxes, have been completed. In the improvement of valves, hydrants, water services and the proper adjustment in pipe laying, and in the improvement in the system of our machine shops, foundry and engines houses, etc. : a large amount will be saved in the operation of the Department, when all has been completed.

I have the honour to be, Gentlemen,

Your obedient servant,

A. DAVIS,

Superintendent of M. W. W.



APPENDIX.

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REPORT

OF

ASSISTANT-SUPERINTENDENT.

A. DAVIS, Esq.

Supt. M. W. W.

DEAR SIR,

I herewith beg to submit for your information the following brief report upon the meter and house service inspection branches of the Water Department for the year 1893.

METERS.

The number of meters in use at the end of the year was 779.

The City owns 704, the other 75 belong to private individuals or companies.

There were 98 new places metered, and 81 meters in use were discontinued. There were 133 changes of meters for various reasons, some being out of order and others too small.

The number of meters damaged by frost was 21, two of these were completely destroyed.

The Department purchased no meters in 1893 although it is well known that it is very advantageous for the Department to have its own meters employed, it is besides this a source of revenue.

Private parties purchased during the year 1893, 14 Crown Meters.

1 — 6"
1 — 4"
1 — 2"
1 — 1½"
5 — 1"
3 — ¾"
2 — ½"

he water sold by meter in 1893 and the year previous, is as
ows :

	1892 Millions of gallons.	1893 Millions of gallons.
ways, including Street Railway.....	68 84	86 98
ries and engines.....	179 75	202 25
itors etc., including those at railways and hotels	175 86	162 29
eries.....	28 59	30 26
s.....	36 25	42 01
ols, Convents and Colleges.....	28 67	36 29
itals and houses.....	6 77	7 37
ch organs.....	6 69	6 89
ellaneous, photographers, livery stables dyers etc..	31 85	8 93
ide City limits.....	109 48	104 66
Totals.....	672 75	687 86

Showing an increase of $2\frac{1}{4}$ 0/0 over 1892.

The following is a list of meters in use from 1876 to 1892 :

Years.	Property of W. W. Dept.	Property of Private Parties.	Totals.
1876.....	279.....	68.....	347
1877.....	294.....	74.....	368
1878.....	239.....	73.....	312
1879.....	227.....	70.....	297
1880.....	236.....	69.....	305
1881.....	266.....	65.....	331
1882.....	307.....	63.....	370
1883.....	380.....	46.....	426
1884.....	421.....	47.....	468
1885.....	467.....	41.....	508
1886.....	508.....	36.....	544
1887.....	542.....	47.....	589
1888.....	562.....	54.....	616
1889.....	610.....	60.....	670
1890.....	634.....	59.....	693
1891.....	646.....	56.....	702
1892.....	678.....	61.....	739
1893.....	704.....	75.....	779

HOUSE SERVICE INSPECTION.

The inspection has been kept up throughout the year by 6 inspectors.

The result of this inspection was the discovery and stoppage of waste from defective fittings as enumerated below, viz :

	1892.	Galls. per hour.	1893.	Galls. per hour.
Waste out of repair. 5009 wasting	63616		210 wasting	39284
Waste	81	" 1220	21	" 420
Waste	4523	" 88797	2291	" 46282
Waste	76	" 1161	34	" 585
Waste	159	" 3295	58	" 1545
Waste	332	" 4329	259	" 4028
Waste	508	" 11387	184	" 4440
Waste	18	" 100	4	" 95
Waste	822	" 14991	438	" 8835
Total.	11528	188896	6100	105514

The inspection also shows the discovery of water being

wasting about 687 gal. per hour.
" " " " " 135 " " "

" " " " " " " 10.

" " " " " " " 43.

" " " " " " " 4.

" " " " " " " service pipes.

Waste from service pipes of water wasting per house.

" " " " " " " 44, although only 6 inspectors

" " " " " " " of 13 in 1892, doing the same

" " " " " " " service, and better result.

" " " " " " " the Recorder's Court in 1893.

COMPARISON OF METER RATES WITH RATES BASED ON ASSESSED RENTAL.

	Gallons.
The total quantity of water pumped in 1893 was...	6,352,735,336
That bringing no direct revenue was :	
Flooding private rinks	713,730
Fires	19,978,982
Watering streets.....	80,536,241
Public fountains.....	113,939,654
Harbour in 1893.....	14,000,000
Total	246,796,975
Balance producing revenue.....	6,105,938,361
That charged for at meter rates :	
Railways, including street railway.	86,979,885
Factories and engine.....	202,249,627
Elevators, inclusive of those at hotels and railways.....	162,215,593
Breweries	30,263,122
Hotels	42,012,914
Schools, convents and colleges	36,291,444
Hospitals and houses.....	7,374,201
Churches, for organs.....	6,891,083
Miscellaneous, livery stables, res- taurants, &c.....	8,925,858
Total.....	687,858,406
Balance being that charged for at rates based on rental and special rates and including waste.....	5,418,079,955
The revenues from water in 1893 was	\$646,146.10
That from metered water, including rent of meter was.....	138,747 92
Balance being revenue from rates based on rental and sundry spe- cial charges.....	507,398.18
Total water from which revenue is delivered, being at the rate of 10½ cts per 1000 gals.....	6,105,938,361

From water sold at meter based on meter rate of 2 1/2 cts. per 1000 gals.....	5,418,079.355
From water sold at meter rates, meter rate 11 1/2 cts. per 1000 gallons.....	687,858.406

It shows that the meter yielded per 1000 gallons, by meter rate,
is more than double that at rates based on assessed rental.

Your obedient servant,

[Signature]

J. O. ALFRED LAFORST,
Ass. Supt. M. W. W.

LOW LEVEL PUMPING STATION.

Jan. 15th 1894.

A. DAVIS, Esq.,

Superintendent of Water Works.

DEAR SIR,

My report for the year ending December 31st 1893 is herewith respectfully submitted.

No. 1 WHEEL HOUSE.

Only a section of the repairs, recommended in my last year report was carried out, which consists in the patching of the wooden sheeting of the walls and floor and the renewing of some of the stairs. Temporary upright posts had to be placed under the floor sills in order to keep them from giving away. All other repairs recommended remains yet unfinished. The interior of the building presents a very neglected appearance, the paint being worn off in many places. In consequence of the roof not having been painted, the sheet iron covering has been eaten through in many places and requires to be renewed or considerably repaired.

Nos. 2, 3 AND 4 WHEEL HOUSE.

This building is in the same condition as when last reported upon. The repairs recommended should be carried out as its appearance is anything but favorable looking.

THE MACHINE SHOP.

The only repairs done to this building was the renewing of the wooden stairs, all other necessary repairs reported last year should be accomplished.

No. 1 ENGINE HOUSE.

A window was broken through the basement wall at the north east corner of this building, and a glass door substituted for the bottom door in the center of north side, by this means we are enabled to move about without the aid of artificial lights in the day time. In order to accomplish the above work, together with the removal of the stone foundation, to a depth that would allow of a brick foundation peculiar to the requirement of the new

Washington engine. It was found necessary to place steam coils in the basement in order to keep the pipes connected with No. 1 engine from freezing. As owing to the severe weather during the months of November and December, they were frozen several times notwithstanding the sharpest vigilance.

The 36" delivery pipe of the new engine having to pass through the room heretofore used as an office, it leaves this room no longer serviceable for this purpose. At present we are using the weigh house attached to the large scales as an office.

An opening was made in the south side of this building, to furnish space for the 36" suction pipe from the tank to the new engine and a portion of the basement platform repaired in order to retain the engine room floor in position while the stone foundation of the old Colburn engine was being removed, the whole flooring had to be secured in position, by means of upright posts. The repairs done to the sheet iron roof does not prevent the rain from making its way through, consequently a new roof will be necessary. The series of cupboards placed in the work, store and oil rooms, the oil cabinet and steam coils were much required improvements and will enable us to acquire systematic order in the keeping of our tools and stores. That portion of the repairs called for last year that remain undone will require completion this year.

NO. 3 ENGINE HOUSE.

The repairing to this building consisted in removing that portion of the chimney above the roof. The other repairs called for, should be done this year.

THE BOILER HOUSES.

The repairs done to this building were the renewing of the broken and sealed bricks. All the repairs recommended last year are urgently required and should be carried out this year.

The wooden tramway was repaired, that is to say the portion of it which fell down.

THE COAL SHED.

None of the repairs asked in my last report were carried out. Fire broke out several times in the coal during the months of November and December, necessitating the removal of a large quantity of the coal stored in the shed, and for this purpose we were obliged to pull down the whole sheeting of the south side, to allow the gas and smoke to escape while the men were removing the coal. You had this side replaced in panels, so that in future under similar circumstances, opening may be effected with facility.

THE DWELLINGS.

The buildings are in the same condition as when last reported upon. If they were the property of a private individual he would be prosecuted for their unsanitary condition. The repairs stipulated before are very necessary and should be carried out this year.

BRASS FOUNDRY.

This building is in fairly good condition but still requiring the repairs previously asked for

THE GROUNDS.

The repairs recommended in my last report were not carried out. However we have succeeded in keeping the grounds in fairly good order. That portion of the settling basin bank between the engine and boiler houses has been uprooted for the laying of 3" suction pipes and controlling valves of the suction mains to the new engine.

There were five valves placed, one between the tank and settling basin, or on the old suction pipe of No. 1 engine, one on the suction pipe of No. 3 engine, one on the pipe that connects No. 3 engine suction with the tank, two on the proposed new suction, that is to connect with the aqueduct above its entrance into the settling basin. Owing to this work being done during the months of November and December, the filling in of the cuts could not be properly done, and, as a consequence, considerable work will have to be done to them in the spring, to place this portion of the grounds in their former condition.

The work recommended in last years report should be carried out this year, particularly the covering of No. 2 wheel race, which is not safe.

No. 1 TURBINE WHEEL.

Only minor repairs were done to this wheel. New ball air cocks were placed on the valve chests, their drip pipes being connected with one common discharge. Large galvanized pans have been placed under the valve chests, which trap leakage water and conducting it to where it is discharged into the wheel pit.

The wheel at time of writing is in good order not likely to require many repairs during the year. It should be furnished with a new revolution counter of the type of the one attached to No. 1 Engine which give good satisfaction.

No. 2 OR OLD BREAST WHEEL.

This wheel is being removed at time of writing.

No. 3 WHEEL.

This wheel is in the same condition as when last reported upon. The pumps work loosely from their holding down girder and are held in position by various contrivances. They are 38 years old and very much worn, they should be renewed and replaced by the modern machinery used for such work.

No. 4 WHEEL.

This wheel is very much in need of heavy repairs. The pistons are much worn and probably should be renewed. The pump rods should be skinned, new neck bushes fitted in the stuffing boxes and the glands rebushed and otherwise repaired ; but I am opinion that it should be wise to carry my suggestion of last year which when done would leave a new pump.

No. 1 ENGINE.

The repairs to this engine were slight consisting in the making of two of the high pressure cylinder head joints, making two of the main steam pipe joints taking up the lost motion on some of the parts, replacing nine pump valve springs which were found broken and renewing some of the cylinder drain pipes, also some repairs to the wooden lagging and skinning up of the pistons rods of the independent air pump vale springs. When the new engine is in reliable running order the engine should be overhauled to ascertain the condition of its internal working parts and with all its connection should be painted.

No. 3 ENGINE.

This engine is in fairly good order, it may however be found necessary to renew some of the cylinder and jacket pipes, to take up all the last motion on all the working parts, to reface all the pump rubber valves and thoroughly overhaul the boiler feed pump and probably furnish it with new plungers, as there is reason to believe that there is considerable of a by-pass. The pistons should be examined and the rings set up, and the whole should be painted.

No. 1 BATTERY BOILERS.

This battery worked well during the year and at time of

writing are in good order. They were inspected and tested by Mr. E. O. Champagne, the City Boiler Inspector, on the 6th of June and pronounced by him to be in good condition, I did not receive his certificate. Two sections of the 2 feed pipe in front of the boiler split, they were removed and replaced. One of the check valves on the feed pipe gave trouble, it was removed and replaced by a new one. The brick furnaces were frequently rebuilt, this work is done by the firemen. They passed the year without new grate bar, but a new set will be required at an early date. The glass faces of the steam gauges are and have always been of the ordinary common window glass and break frequently, a better quality of glass will remove this trouble. The front and pipe connection should be painted and a set of tube cleaner will be necessary.

No. 2 BATTERY OF BOILERS.

This battery was called into requisition in February, March and April owing to the heavy consumption of water during these months, which made necessary the continuous working of both engines, and on some occasions above their rated capacity in order to keep up the supply, they were used to furnish steam to No. 3 engine while No. 3 battery was being cleaned, some slight repairs were done to the feed pipes, brass mountings and steam pipes. They were tested by the City Boiler inspector on the 28th of July and declared all right. These are the boilers to be removed in order to make room for the new boilers now in course of construction.

No. 3 BATTERY OF BOILERS.

These boilers at the time of writing are in good order, some repairs of a slight nature to the brass mountings feed and steam pipes, will be required. The boiler setting brick retaining wall at the west end of this battery is very much bulged out, it is held in position by temporary staving, it should be pulled down and rebuilt. When No. 2 battery is being removed the severing of the steam and feed water pipes connections and other parts will make necessary some changes and repairs that will be better seen during the removal than at present. A set of grate bars will be required and the front and pipe connections should be painted. These boilers were also tested on 28th July.

In conclusion, I beg to tender you my thanks for the able assistance you so cheerfully rendered me in the discharge of my duties.

The whole respectfully submitted,

I have honor to be

Your obedient servant,

D. KEARNEY,

Engr.

HIGH LEVEL PUMPING STATION, McTavish Street.

January 1894.

A. DAVIS, Esq.

Superintendent Montreal Water Works.

SIR,

I beg to submit my annual report for the year ending December 31st, 1893, on the work done, the conditions and requirements of the McTavish and High Level pumping station.

THE WORTHINGTON ENGINE

Is in the same condition as last year and requires some light repairs. It did no work for the past year. The consumption has increased so much that this engine cannot force water higher than the level of Pine Avenue. This engine did good work during its time. The section has got so large for the past six years that this engine is too small to be of much service to the department. Still it would be advisable to keep it until we get one of a more suitable size for the account of work to be done.

THE GILBERT ENGINE.

This engine is working every day and has worked well throughout the year, giving no trouble other than the breaking of a stem valve in the air pump bucket and the displacing of another in the hot well. I put in two valves in the air pump bucket which I had on hand. This and other small repairs have been done at the low level work-shop. The friction pulley of the fan gear got accidentally broken and had to be replaced by another of an improved pattern. The steam and water feed valves require grinding as some of them are breaking but the engine being at work daily there is no time or chance to repair for want of a duplicate engine. I consider the High Level Station is much in need of a second engine. The joints or steam pipes gave much trouble in keeping them tight with rubber or asbestos joints. I got them all made with corrugated copper which has stood well for several months past. The wood casings on the cylinders require repairing as the wood is charred and falling off. The steam pipes require to be covered anew. The old covering is giving away and falling off. Sectional magnesia is most recommendable for that purpose. The engine and pumps require painting and varnishing.

I would recommend Blackman's patent fans for furnace blast

instead of the present ones. It would relieve the engine considerably. I renewed fifteen rubber valves and sixty-seven brass wire springs in pumps during the year.

GILBERT BOILER

The Gilbert Boiler has been in good working condition. It worked in turn with the White Boiler during the year. It has been tested by the Inspector and stood two hundred pounds cold water pressure. The water heater connected with this boiler is worn out for the past ten years and is much against the working of the boiler as the water feed enters at a very low temperature. It requires to be renewed as soon as possible.

The boiler requires to be covered anew as the present covering is burnt and falling off. This boiler required no repairs for the past year other than the making of steam joints on the super-heater. It would be recommendable to have the smoke box or combustion chamber enlarged and the sheet iron flue to be renewed. A straight one connecting with the chimney would be preferable, as the boiler seems choked in its draught and the gas ignites on some occasions. I would also recommend a blow-off pipe from the safety valves of boiler up through the roof of the building.

THE ' WHITE ' BOILER

This boiler worked in turn with the Gilbert during the year. It was inspected and tested to two hundred pounds cold water pressure. It required no work nor repairs done to it other than making joints on steam pipes and super-heater. It would be well to enlarge the smoke box or combustion chamber as the boiler seems choked in its draught; also change the top sheet iron flue to a straight one and do away with the bends connecting with the chimney. A blow-off pipe from safety valve of this boiler is also required.

THE OLD ENGINE ROOM

Requires painting, oak graining and a new floor as the present one is decayed, also a new oil cloth for the same. The water closet is in very bad condition and needs to be attended to. A wash basin and stand are badly needed here. The water course around outside of this building is all broken by the frost and a new one is required.

THE NEW ENGINE ROOM

This room requires to be newly painted the walls, ceilings and floor and a new oil cloth. Six iron girders to be laid across the

beams for lifting purposes, 18 feet long and strong enough to raise a ton weight in the centre. The place is much in need of a store room in which to place supplies.

THE BOILER HOUSE.

This building requires a new floor of flagging or rock cement. The back walls must be repaired as soon as possible as rain and snow water is coming through it thus injuring the walls and roof considerably. One of the rafters has decayed so much in the wall, we had to support it with an upright timber from the floor. The other rafter requires supporting in the same way. The inside of this building requires white washing and a few other repairs to the roof.

THE CHIMNEY.

A conical-shaped sheet iron lining is necessary for this chimney from the middle to the top as the one in use at present is not proportioned with the boilers and we are compelled to use a force draught all the time. This causes more coal to be burned on the same work than if we had a natural draught. Owing to the shelter from the mountain it would require a chimney 200 feet high. The present one is only 95 feet.

COAL SHED.

The roof of this shed is leaking and requires to be caulked with oakum and pitched tarred and covered with three inch timbers. The back wall to be repaired as the surface water is coming through it.

MCTAVISH RESERVOIR.

The supply from this reservoir was continually in the city during the past year; the old portion of the centre wall needs repairing. It leaks so badly from side to side that a reserve cannot be kept in either. The masonry in back wall requires grouting and pointing with cement, also to be puddled with clay as considerable surface water is getting into the reservoir. The retaining walls want a thorough repairing as there are a great many defective joints caused by the ice sticking to the wall; it takes the cement out of them. The south side of reservoir had to go under temporary repairs last summer. There were some leaks from it into the McGill grounds. There is a leakage in the dry tunnel in front of valve house. There are several of the coping stones of the old portion crumbling away and require to be repaired.

It would be recommendable to concrete the bottom of the reservoirs, as they are at present very rough and expensive to clean out. It would also save considerable time. At present it takes a week to clean them which is a long time to keep them empty. The revetment wall requires a new covering of $1\frac{1}{2}$ inch boards of which it will take about 400 and about 75—3 inch plank the same to be coated with tar. The wood fencing around reservoir property requires straightening and painting. The banks and slopes were kept in good order during the past summer, the weeds cleaned out and the grass cut regularly. It would be an improvement to make macadamised road on reservoir bank from the entrance on north side to coal shed as the coal carts keep the banks cut up and hard to keep in order. There is a great want of an electric light at the north side of reservoir, on Carleton Road at entrance of reservoir gate. It would be a great benefit to us as well as to the public as this corner is in total darkness.

THE VALVE HOUSE.

The walls require pointing on the outside. The roof, doors, windows, ceilings and cornices to be painted. The flood gates in over flow passage are decayed and want renewing. We got a new water float for gauge. We want some iron brackets to stay valve rods in the well. They are temporarily fixed with wood at present.

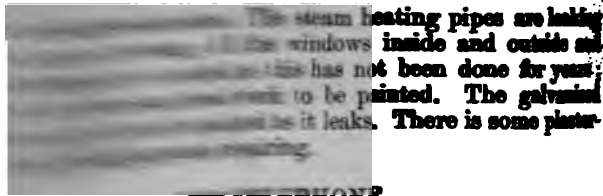
HIGH LEVEL RESERVOIR.

This reservoir was kept continually full for the past year on its section. The retaining walls want considerable repairs. There is a number of bad joints in the masonry and it shows leaks at the bottom of the slope. At the back and ends of reservoir there is considerable surface water getting in. The valve house wants a new door and frame as the old ones are decayed. There was a new telephone placed there last spring which is of great use. A low water gauge is much wanted there in case of a main pipe getting broken. It would give the alarm in engine house or dwelling. A small boat is required for this reservoir.

DWELLING HOUSE.

This requires some sanitary improvements. The extension of the engine room water closet to the top of the dwelling and the water closet of dwelling placed therein would allow the pipes to be removed from one of the principal rooms of the house which they at present pass through and cause a dangerous and disagreeable smell. There were \$150 appropriated for this two years ago

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THE TELEPHONE.

There is a defect in the instrument or
it gives very poor satisfaction for the
has been kept, it is a useless bill of
gave good service and satisfaction

THE SCALES.

The old ones were all
They were inspected by the revenue
required. The present one is
a new cover over scales will require
the weather.
submitted.

Yours honor to be, Sir,

Your obedient servant,

JAMES COLEMAN

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WATER WORKS SHOP.

January, 24th. 1894.

A. DAVIS, Esq.

Superintendent Water Works.

DEAR Sir,

I respectfully submit the report of the work done under my direction, during the year ending December 31st 1893.

MAIN IMPROVEMENTS, REPAIRS, ETC.

Schedule No. 10 shows the name of the streets, the size, and length of pipes laid in each of them. Schedule No. 8a shows that one hundred and forty-nine repairs were done to the main pipes in the whole city. Most of these were caused by old age and the action of the frost which was very hard on the pipes last winter.

Thirteen valves were renewed and thirty-four valves spindles were also renewed on account of old age ; they were broken and worn out.

The main pipes in the following streets should be replaced by larger ones, and laid deeper, as they are now too small, and too shallow and exposed to the frost.

Maisonneuve, from Dorchester to Ontario streets.

Visitation, from Craig to north of Mignonne street.

Seigneurs St., from Dorchester to top of hill, about 400 feet long.

The high level pipes are connected to the low level main pipes at the following places :

St. Catherine St. west of Atwater Avenue, 6" connection.

St. Mathew St. south of Lincoln Avenue, 6" "

Guy St. south of Lincoln Avenue, 6" "

Sherbrooke St. west of Mountain St. by 6" main.

Bishop St. south of Sherbrooke St., 6" "

Crescent St. south of Sherbrooke St. 6" connection.

Peel St north of Sherbrooke St. 4" "

Drummond St. north of Sherbrooke St. 8" "

McTavish St. south of Carleton Road, 8" "

Windsor St. south of Dorchester St. by 12" "

University St. north of Sherbrooke St. 12" "

Oxenden Ave north of Prince Arthur St. 6" "

Park Ave south of Pine Ave by 8" "

University St. north of Prince Arthur	4"	Connection
St. Urbain St. south of Pine Ave by	4"	"
St. Lawrence St. north of Roy St. by	10"	"
Napoleon St. east of St. Lawrence by	4"	"
Prince Arthur and Cadioux Sts by	12"	"
Mount Royal Ave east of Cadioux St.	12"	"
Rachel St west of St. Denis St.	12"	"
Amherst. and Rachel Sts.	12"	"
Sherbrooke, west of St. Lawrence St.	12"	"

There is a valve on each of the aforesaid connections, those valves are always shut and locked, and cannot be interfered with by any body without special permission, those valves have to be opened three or four times a year to clean the water in the pipes as the water is dead at both sides of said valves.

The laying of the high level belt and fire line of 12" pipe through Sherbrooke, Amherst and St. Lawrence streets last summer was a very great improvement.

This high level line should be completed as soon as possible through Sherbrooke street, Papineau, and Rachel to Amherst street. Through Mary-Ann, Duluth Ave and Roy street from St. Urbain to Amherst street.

HYDRANT IMPROVEMENTS, REPAIRS, Etc.

Schedule No. 8a shows that two hundred and fifty-six hydrant rods were broken. Most of the aforesaid hydrant valves were found defective on account of the freezing and heating last winter, bad usage from inexperienced men, and the contraction by frost caused the breakage of the aforesaid 36 hydrant rods.

One thousand one hundred and sixty-nine hydrants were reported frozen (1169. Seven thousand seven hundred and six-two times last winter. This was the hardest winter we had for the last sixteen years; there was no snow protection and the ground was found frozen eight feet deep in many streets.

However, I hope that the improvements made on your new hydrants will save them from frost in future. Twenty eight of your improved hydrants were put in.

I am happy to say that all the hydrants were found in good order at all the fires that occurred last winter. This shows that the inspection was needed.

New hydrants are wanted in the following streets.

Mackay and Sherbrooke streets

Bishop and Burnside "

Crescent and Burnside "

Sherbrooke and Crescent	streets
Seminary and McCord	"
Victoria and St-Catherine	"
St-George and Lagauchetière	"
St-Hubert and St-Louis	"
Perthuis and Lacroix	"
Robillard and Moreau	"
Opposite 241 St-Charles	street
" 65 St-Charles	"
" 192 Bourgeois	"
" 82 Panet	"
" 137 Mansfield	"
" 129 Lusignan	"
" 46 Versailles	"
" 157 Young	"
" 183 St-Urbain	"
" 12 Bonsecours	"

Church street between Ontario and Sherbrooke streets.

St-Charles Borromée street at Mantha's Mill.

St-Ann's Cotton Mills Notre-Dame street.

Schedule No. 8 show the number of hydrants put in during year 1893; also the number of patent hydrants in position up to January 1894.

REPAIRS TO SERVICES Etc.

Schedule No. 8 shows the number of leaks found and repaired on the service pipes; the number of service boxes changed; the number of pipes found frozen in the street &c.

All the service pipes in Mignonne street from Papineau av. to Beaudry street should be dug and laid lower.

The services on Papineau av. from Mignonne to Lafontaine street are also too shallow. The frost in these streets was found five feet and a half deep.

PUBLIC FOUNTAINS Etc.

The ordinary repairs were done to the fountains, drinking troughs, &c.

The trough and drinking tap now at the corner of Guilbault and St-Lawrence street must be removed, and it could be placed opposite the Hotel-Dieu wall on St-Urbain street.

The fountains should be all painted early in the spring. They have not been painted for the last two years.

The show fountain in St-Patrick Square should be removed and could be put in Dufferin Square as it will never be any use where it now stands.

Permit me to thank you in my name, also in the name of all the employees of the Water Department under my supervision, for the valuable advice and the impartial manner you treated us all.

Most respectfully submitted,

Your Obedient Servant,

CHAS. LAGACE,

Foreman

MONTHS.	Pumping time.	Revolutions.	Gallons pumped.	Average pressure in air vessel.	IN POUNDS.				Coal for fuel.
					Castor oil.	Tallow.	Coal oil.	Waste.	
1893.	Hrs. M.								
January	740.00	590,572	137,603,276	.....	207.00	.....	155.00	25.56	103,530
February	554.55	282,351	65,787,783	.....	105.75	.....	127.00	24.50	92,350
March	196.15	137,208	31,969,464	.....	36.00	.....	118.00	14.37	94,050
Ap ril	717.10	587,329	136,847,657	.....	135.00	36	138.00	23.31	77,380
May	744.00	631,389	147,113,637	.....	139.50	.....	134.00	21.50	17,060
June	720.00	610,781	142,311,973	.....	135.00	40	120.00	27.87	.....
July	740.00	616,129	143,558,657	.....	139.50	.....	124.00	27.18	.....
August	744.00	611,576	142,497,208	.....	139.50	40	130.00	23.87	.....
September	720.00	577,641	134,590,353	.....	135.00	.....	135.00	23.75	.....
October	744.00	589,226	137,289,658	.....	139.50	38	143.00	24.18	.....
November	653.05	505,892	117,872,836	.....	130.50	.....	152.00	27.25	26,109
December	740.00	567,402	132,204,666	.....	139.50	.....	155.00	25.75	104,620
Total	8013.25	6,307,496	1,469,646,568	.....	1,581.75	154	1,631.00	289.09	515,090
Last year ..	7418.05	6,307,575	1,469,664,975	76	2,225.25	120	1,541.00	259.85	494,940

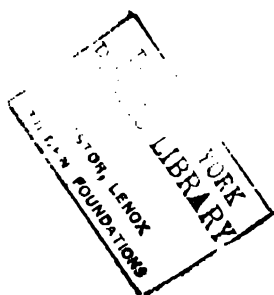
SCHEDULE No. 2—SHOWING THE WORK OF THE BREAST WHEEL No. 2 AND TURBINES Nos 3 and 4.

Months	Time of pumping			Revolutions			Gallons pumped.			In pounds.		
	Hrs. M	Hrs. M.	Hrs. M	Turbine No. 2.	Breast wheel No. 2.	Turbine No. 1.	Breast wheel No. 2.	Turbine No. 3.	Turbine No. 4.	Total Gallons pumped.	Castor Oil.	Waste.
January	129.30	705.30	.....	.....	885,401	.....	12,283,408	76,402,486	88,685,894	112.50	104
February	82,996	.....	173,950	.....	.....	.....	.....	50.00	12.37
March	231.35	.....	.....	926,599	.....	63,913,652	79,687,514	143,601,166	24.75	72
April	562.25	718.15	431,849	.....	594,977	.....	88,056,566	87,120,236	175,176,802	171.00	139
May	744.00	744.00	594,977	.....	1,013,026	.....	84,731,332	89,418,124	170,149,456	180.00	135
June	715.30	720.00	572,509	.....	993,234	.....	83,308,904	80,197,136	172,506,040	168.75	120
July	707.45	744.00	562,898	.....	1,037,176	.....	85,170,744	88,326,300	173,497,044	175.50	124
August	734.45	744.00	575,478	.....	1,027,050	.....	81,364,036	83,223,232	164,587,268	168.75	135
September	720.00	720.00	549,757	.....	967,712	.....	78,380,052	81,094,066	160,474,118	178.25	143
October	730.50	744.00	529,599	.....	940,931	.....	67,310,844	69,096,096	136,406,940	164.25	163
November	643.05	650.30	454,803	.....	801,729	.....	64,383,404	69,096,096	133,479,500	130.50	118
December	604.25	296.25	435,023	.....	338,000	.....	.....	.....	.....	.....	.....
Total	6289.15	7018.15	4,780,880	.....	9,119,408	.....	708,003,572	784,303,400	1,492,306,972	1,606.75	1179
											200.47	

MONTHS.	Pumping time.		Revolutions.	Gallons pumped.	COAL USED IN POUNDS.			To raise 1,000 gallons.		Average pressure in air vessel.	IN POUNDS.								
	Hrs.	M			For pumping.	For banking.	.....	Cylinder grease.	Valvoline.		Seal oil.	Castor oil.	Cylinder oil.	Coal oil.	Cotton waste.				
1893.																			
January ..	163. 15		134,341	73,887,550	237,610	40,020	3,757	.....	.....	.....	45	8.87	15.75	.....	48	11.75			
February ..	666. 45		532,966	293,131,300	975,360	.....	3,397	.....	.....	.....	202	71.00	65.25	3.	224	22.75			
March ..	744. 00		569,808	313,394,400	1,021,110	.....	.....	.....	.....	.....	.....	79.87	69.75	248	256	23.56			
April ..	532. 10		356,767	196,221,850	661,150	6,060	3,400	.....	.....	.....	.....	35.50	54.00	176	.....	30.63			
May	529. 15		361,126	198,619,300	707,170	6,300	3,592	.....	.....	.....	240	44.37	67.50	32	168	15.00			
June	383. 50		278,924	153,408,200	536,940	3,850	3,525	.....	.....	.....	180	35.50	40.50	.....	128	15.00			
July	416. 00		305,816	168,198,800	550,390	10,180	3,332	.....	.....	.....	120	35.50	54.60	40	136	20.00			
August	662. 45		493,447	271,395,850	879,690	7,380	3,268	.....	.....	.....	330	71.00	63.00	.....	240	20.43			
September .	520. 05		372,652	204,958,600	705,560	8,020	3,481	.....	.....	.....	240	44.37	54.00	.....	192	15.31			
October	584. 20		449,064	246,985,200	865,040	9,150	3,539	.....	.....	.....	360	71.00	58.50	.....	208	22.87			
November ..	534. 35		397,578	218,667,900	884,330	7,610	4,078	.....	.....	.....	262	71.00	56.25	.....	232	27.93			
December..	504. 30		371,796	204,487,800	751,400	3,360	3,691	.....	.....	.....	195	71.00	51.75	.....	224	15.75			
Total...	6241. 30		4,624,285	2,543,356,750	8,775,740	101,930	3,495	.....	.....	.....	2174	638.98	650.25	528	2256	240.93			
Last year.	2725. 30		2,229,539	1,204,246,450	3,932,160	251,510	3,476	75	10.	.....	68	336.49	420.12	732	792	181.42			

SCHEDULE No. 4—SHOWING THE WORK OF STEAM ENGINE, No. 3.

MONTHS.	Pumping time.	Hrs. M.	Revolutions.	Gallons pumped.	COAL USED IN POUNDS.			Average pressure on pump pistons.	IN POUNDS.							
					For pumping.	For blanking.	To raise 1,000,000 gallons.		Cylinder oil.	Seal oil.	Coal oil.	Castor oil.	Cylinder grease.	Valvoline.	Cotton waste.	
January	379.05		473,225	206,326,160	1,182,120	4,260	5,750	.....	.....	71.00	216	54.00	.....	.....	172.0	31.50
February	432.00		299,851	130,735,036	736,380	32,930	5,884	.....	.....	53.25	120	45.00	.....	.....	180.0	21.11
March	675.50		447,042	194,910,312	1,115,010	7,100	5,757	.....	.....	71.00	232	69.75	.....	.....	262.0	22.62
April	193.55		139,081	60,639,316	342,000	14,900	5,895	.....	.....	17.75	48	22.50	.....	.....	97.50	10.25
May	200.30		148,459	61,728,124	359,300	6,330	5,649	.....	.....	8.87	56	20.25	.....	.....	6.50	11.31
June	203.30		156,171	68,090,556	385,820	1,800	5,693	.....	.....	17.75	64	18.00	.....	.....	75.00	12.00
July .....								.....	.....	.....	40	9.00	.....	.....	52.50	8.00
August	107.25		81,761	35,617,796	194,880	8,698	5,710	.....	.....	.....	40	9.00	.....	.....	52.50	8.00
September .....								.....	.....	.....	.....	40	9.00	.....	.....	.....
October .....								.....	.....	.....	.....	40	9.00	.....	.....	.....
November	79.05		48,703	21,234,508	148,670	10,110	7,477	.....	.....	17.75	40	9.00	.....	.....	45.00	12.00
December	204.50		137,278	64,213,208	374,030	8,050	5,950	.....	.....	26.63	61	18.00	.....	.....	75.00	14.50
Total	2,656.10		1,941,571	846,524,956	4,838,810	94,178	5,827	.....	.....	284.00	880	265.50	.....	.....	1027.50	143.29
Last year.	1,633.40		1,255,345	547,330,420	2,841,610	211,192	5,600	75	303	204.41	480	161.40	21	382.50	140.90	

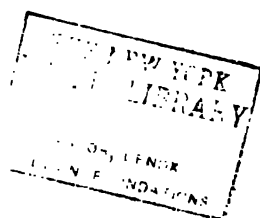


TOTAL 1977...	11,605,000,910	105,120,330	115,800,000	9,126,083	2,466,546	3,290,306	1,490,685	9,678,539	4,798,840	14,177,581</
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SCHEDULE No. 4—SHOWING THE WORK OF STEAM ENGINE, No. 3.

COAL USED IN POUNDS.

10.



SCHEDULE No. 5—SHOWING TOTAL PUMPING AT LOW LEVEL PUMPING STATION.

MONTHS.	BY WATER POWER.				BY STEAM POWER.			TOTAL FOR EACH MONTH.				Percent- age.		Av. level of water.
	Wheel No. 1.	Wheel No. 2.	Wheel No. 3.	Wheel No. 4.	Engine No. 1.	Engine No. 2.		By water.	By steam.	By water and by steam.		By water.	By steam.	
January	137,603,376	.....	12,283,408	76,402,486	75,887,550	206,326,100		226,289,170	280,213,650	506,502,820	44.68	56.32	38.06	36.00
February	65,787,783	.....	.....	.....	203,131,300	130,735,036		65,787,783	423,896,336	489,684,119	13.44	86.56	36.92	36.00
March	31,969,464	.....	.....	14,959,700	313,394,400	194,910,312		46,929,164	568,304,712	615,233,876	8.46	91.54	36.35	35.97
April	136,847,657	.....	63,913,632	79,697,814	196,221,850	60,639,316		280,448,823	256,561,166	537,009,989	72.20	27.80	39.00	36.60
May	147,113,637	.....	88,056,596	87,120,236	198,619,300	.....		322,290,469	198,619,300	520,909,769	61.88	38.12	41.53	36.99
June	142,311,973	.....	84,731,332	85,418,124	153,408,200	64,728,124		312,461,429	218,136,324	530,597,753	58.89	41.11	40.97	36.99
July	143,558,037	.....	83,308,904	87,197,130	168,198,800	65,000,556		316,064,007	236,283,556	552,353,453	57.23	42.77	39.44	36.95
August	142,497,298	.....	85,170,744	88,326,300	271,305,850	.....		315,994,252	271,305,850	587,300,102	53.80	46.20	38.56	36.83
September ..	134,590,353	.....	81,904,036	83,223,232	204,958,000	35,647,796		269,177,621	240,606,396	509,784,017	55.43	44.57	38.34	36.76
October	137,289,658	.....	78,380,632	81,694,166	246,959,200	.....		297,364,376	246,959,200	544,324,576	54.63	45.37	38.36	36.34
November	117,872,836	.....	67,310,844	69,306,690	213,667,900	21,234,008		254,390,376	239,902,408	494,292,784	51.45	48.55	37.63	36.06
December	132,204,666	.....	64,383,404	29,068,000	204,487,800	64,213,208		225,656,070	268,701,698	494,357,768	45.64	54.36	37.34	36.00
Total	1,469,646,568	.....	708,903,572	784,303,490	2,543,356,750	546,524,956		2,962,853,630	3,889,881,706	6,852,735,336	46.64	53.36	.....	.....
Daily Aver. 365 days.	4,026,429	.....	1,942,201	2,148,777	6,968,101	2,319,246		8,117,407	9,287,347	17,404,754	.....	.....	.....	.....
Total 1892.	1,469,664,976	384,728,220	775,983,832	900,380,538	1,904,246,450	547,330,420		3,032,666,565	1,701,578,870	4,734,245,431	67.42	32.58	30.00	36.40
Daily Aver..	4,026,480	1,054,049	2,125,983	2,466,546	5,209,309	1,498,535		9,678,639	4,708,840	14,387,479	.....	.....	.....	.....

SCHEDULE No. 6.—SHOWING THE WORK OF ENGINE No. 2. (THE GILBERT) AT HIGH LEVEL PUMPING STATION.

MONTHS.	Pumping time.	Hrs. M.	Revolutions.	Gallons pumped.	Average pressure in air vessel.	COAL USED IN POUNDS.				IN POUNDS.			
						For pumping.	For banking fires.	To raise 1,000,000 gallons.	For heating.	Cylinder oil.	Valvoline.	Cotton waste.	Coal oil.
January.....	207. 30		500,789	24,113,494	110	99,693	12,400	4,618	3,481	95.00	.....	20.00	
February.....	179. 30		435,555	20,972,411	110	89,358	11,400	4,804	3,037	.....	85	22.00	
March.....	197. 45		482,623	23,238,782	110	93,090	12,400	4,539	1,146	174.50	.....	50.00	
April.....	199. 30		478,124	23,022,148	110	95,486	12,000	4,688	.....	154.00	.....	48.75	
May.....	235. 30		562,253	27,073,043	110	114,318	12,400	4,680	.....	208.00	.....	35.00	
June.....	234. 00		612,694	29,501,829	110	108,715	12,000	4,090	.....	196.00	.....	35.00	
July.....	222. 45		590,975	28,456,035	110	99,080	12,400	3,917	.....	168.50	.....	25.00	
August.....	244. 40		648,261	31,214,415	110	127,396	16,800	4,619	.....	162.00	.....	25.00	
September.....	240. 30		651,790	31,384,340	110	142,565	18,000	5,116	.....	152.50	.....	30.00	
October.....	256. 15		702,384	33,870,493	110	151,452	18,800	5,025	.....	161.50	.....	33.00	
November.....	232. 30		646,122	31,111,420	110	113,809	18,000	4,236	.....	153.00	.....	30.00	
December.....	238. 30		655,398	31,558,072	110	113,899	18,600	4,198	2,574	151.00	.....	32.00	4.00
Total.....	2698. 10		6,966,968	335,466,482	110	1,348,861	175,000	4,542	10,238	1,739.00	85	385.75	4.00
Last year.....	2139. 15		5,112,757	246,190,399	109	879,477	158,800	4,217	9,681	1,234.25	.....	257.00	
Increase in 1893	558. 25		1,854,211	89,276,083	.....	469,384	16,200	325	557	504.75	85	128.75	4.00

**SCHEDULE No. 7.—SHOWING THE AVERAGE DEPTH OF WATER,
THE RAIN FALL AND TEMPERATURE AT 9 A. M.
AT McTAVISH STREET RESERVOIR.**

MONTHS. 1893.	Average monthly depth of water in reservoir, Feet.	RAIN GAUGES, IN INCHES.				Average temperature at 9 a. m.
		Rain.	Snow.	Snow reduced to rain.	Total rain.	
January	21.55	0.51	15.50	1.84	2.35	6.00
February	22.20	0.16	20.75	2.24	2.40	11.14
March	22.27	0.28	5.75	0.64	0.92	24.58
April	21.95	0.93	7.50	0.72	1.65	37.10
May	22.49	3.46	.....	.....	3.46	56.87
June	22.82	4.35	.....	.....	4.35	68.00
July	20.53	3.74	.....	.....	3.74	68.00
August	21.87	10.20	.....	.....	10.20	69.19
September	22.11	2.31	.....	.....	2.31	58.80
October	21.98	1.81	.....	.....	1.81	53.26
November	21.28	1.62	2.00	0.29	1.91	37.40
December	22.32	0.22	44.75	4.39	4.61	14.00
Total	21.95	29.59	96.25	10.12	39.71	42.03
Last year....	21.98	21.24	113.50	11.41	36.65	40.00

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1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to understand what consumers want and what problems they are facing.

2. Once a market need has been identified, the next step is to develop a concept for a product that addresses this need. This involves brainstorming ideas and selecting the most promising one.

3. The third step is to create a prototype of the product. This allows the designer to test the product's functionality and make any necessary adjustments.

4. After the prototype has been tested, the next step is to develop a business plan. This plan should outline the costs of production, the pricing strategy, and the marketing approach.

5. The final step is to launch the product into the market. This involves manufacturing the product, distributing it, and promoting it to potential customers.

City	State	Year	Population	Area	Population Density
St. Domingue above the Cathedral	France	1960	100,000	100	1,000
St. Domingue below the Cathedral	France	1960	100,000	100	1,000
Notre Dame Cor. Inspection	France	1960	100,000	100	1,000
Richardson rd	France	1960	100,000	100	1,000
Dominion and St. James	France	1960	100,000	100	1,000
St. Antoine Cor. St. Margaret	France	1960	100,000	100	1,000
Dorchester Cor. Baymont	France	1960	100,000	100	1,000
Mountain above Dorchester	France	1960	100,000	100	1,000
Opp. 331 St. Dominique	France	1960	100,000	100	1,000
870 Cadieux rd.	France	1960	100,000	100	1,000
St. Catherine Cor. St. Elizabeth	France	1960	100,000	100	1,000
Opp. 731 Montclair	France	1960	100,000	100	1,000
883 Cadieux	France	1960	100,000	100	1,000
Cadieux below Deloitte	France	1960	100,000	100	1,000
Cadieux above Deloitte	France	1960	100,000	100	1,000

Schedule No. 8a *Cont'd*—Showing the Repairs done to Main Pipes, Hydrants and Valves during year 1893.

POSITION.	DATE.	Diameter.	Valves.	HOW REPAIRED.	Probable cause of injury.
Basin st. under Johnston flume...	March 31	4"	1	Bonnetted 4" pipe outside of wall....	Hydrant pipe blown out.
St. Antoine cor. St. Martin	" 31	"	1	Put in new valve	Old valve worn out.
St. Martin cor. St. Antoine	April 1	"	1	" a new hydrant	Column split on acct of frost.
Conde st.....	" 3	4"	1	Recaulked joint.....	Joint blown out by pressure.
Metcalf above Dorchester	" 4	"	1	Put in new valve	Old valve worn out.
Craig cor. Hermine	" 4	"	1	"	"
Grand Trunk cor. Ropery	" 5	"	1	"	"
Guy cor. William	" 6	"	1	"	"
Cor. Beaudry and St. Catherine	" 7	"	1	Rod put in and new valve	Rod br. by frost val. worn out.
Prince Arthur and St. Famille....	" 8	"	1	Put in new valve	Old valve worn out.
St. Catherine and St. Hubert. ...	" 8	"	1	"	"
Peel cor. Express.....	" 11	"	1	Recaulked joint.....	Joint blown out by pressure.
Noire Dame and Montcalm.....	" 11	"	1	Put in new valve	Old valve worn out.
Alexander and Lagauchetière ..	" 11	"	4	" " spindle.....	When shutting key was hit by team.
William cor. Ann.....	" 12	"	1	Plugged pin hole bottom	Pin hole in bottom.
Sherbrooke west of Drummond..	" 14 30"	"	1	Put in new piece	Pipe broke cause unknown.
Sanguinet opp. 250	" 17	4"	1	"	Pipe burst by frost & old age.
165 Commissioners	" 17	6"	1	"	Joint blown out by pressure.
Sherbrooke and Amherst	" 18	"	1	Put on new braces.....	Old braces worn out.
Cor. St. Catherine and St. Hubert	" 18	"	1	" " valve.....	Old valve worn out.
Opp. 129 Commissioners st.	" 18	6"	1	Recaulked joint	Joint blown out by pressure.
Charlevoix and Châteauguay....	" 18	"	1	Put new hydrant	Old hydrant out of repair.
Atwater and Sherbrooke.....	" 19	"	12	Repacked valve	Old packing worn out.
St. Paul opp. Tripponne	" 19	"	1	Thawed hydrant pipe	Hydrant pipe frozen.
Shannon st. below William	" 20	4"	1	Put in new piece	Pipe burst.

Dorchester corner Chenneville...	April	20 10"	...	Recalked joint	...	Joint blown out by pressure.
Craig corner Volligeurs...	"	20	...	Put in new valve	...	Old valve worn out.
Opp. 383 Plessis...	"	20	...	"	...	"
49 Centre	"	20 4"	...	"	...	Pipe broke by frost.
Visitation corner Delorme Place,	"	21	4	Repacked valve	...	Packing worn out.
Lagauchetière cor. Chenneville.	"	21	...	Put in new valve	...	Old valve worn out.
St. Catherine corner Guy	"	21	...	"	...	"
Opp. 56 Sebastopol st.	"	23	...	"	...	"
Cor. Sherbrooke & St. Dominique	"	24	...	"	...	"
Opp. 73 Visitation	"	24 4"	...	"	...	Pipe burst by frost.
Stanley corner Sherbrooke	"	24	...	"	...	Old spindle broke when shut'g
Mill st. above Waste Weir	"	26 10"	...	Recalked joint	...	Joint blown out by pressure.
Bernard st. cor. Bleury	"	26 4"	...	Put in a new piece pipe	...	Pipe burst by settling of earth
Hypolite above Duluth ave.	"	26	...	Put in new hydrant	...	Old hydrant worn out.
Duluth ave. near Park ave.	"	26 6"	...	"	...	Pipe broke by stones.
St. Urban above Pine ave.	"	27	...	"	...	Old valve worn out.
Cor. Dorchester & St. Dominique.	"	27 10"	...	Recalked joint	...	Joint blown out by pressure.
Cor. Amherst and Lagauchetière.	"	27 4"	...	Put in a new piece pipe	...	Pipe burst by frost.
Park Ave. opp. Duluth Ave.	"	28	...	"	...	Old valve worn out.
Seigneurs opp. McDougalls	April	29	...	Recalked joint	...	Joint blown out by pressure.
Opp. 212 Aqueduct	"	29	...	Put in new valve	...	Old valve worn out.
Opp. 40 St. Maurice	"	29 10"	...	Put in a new piece pipe	...	Old pipe broken by frost.
Seigneurs st. Bridge	May	1	...	"	...	Old hydrant out of repair.
122 Mill st.	"	29	...	Raised hydrant to street level	...	To low for street level.
Sanguinet below St. Catherine...	"	1 4"	...	"	...	Pipe burst by frost.
Duflerin corner Rachel	"	1	...	"	...	Piece of hoop iron dest. old one
Parthenais above Ontario	"	2 4"	...	Put in a piece of pipe	...	Pipe broke by frost.
Mansfield corner Sherbrooke...	"	3	6	Put in a new stuffing box	...	Stuffing box broke.
Coursol st.	"	3	...	"	...	Old valve worn out.
Ontario st. cor. Iberville.	"	4	...	"	...	Old hydrant rod broken.
Opp. 56 McGill College ave.	"	4 4"	...	"	...	" pipe broke by settl'g of earth
Dorchester corner Hanover	"	6	...	"	...	Old valve worn out.
Opp. 22 Sanguinet	"	6 6"	...	Recalked joint	...	Joint blown out by pressure.
Opp. 122 Mill st.	"	6 10"	...	"	...	"
St. Antoine corner Desrivères...	"	8	...	Put in new valve	...	Old valve worn out.

Soulange and Centre	22	6	Put in new spindle and packing box.	of pressure.
Common west of Port	23	1	" " hydrant valve	Old spindle brok. & pack. box.
Oyp. 280 Dorchester	23	10	" " "	Old one worn out.
" 109 Versailles	23	4	" " "	Joint blown out by pressure.
" " "	23	12	" " "	" " " "
Pine Ave near Oxenden	24	4	Put in a new valve	Old valve useless.
Gunning and Notre Dame	25	6	Repacked valve	" packing worn out.
Chenneville cor. Lagauchetière	25	6	" " "	" valve worn out.
Central Fire Station	26	8	" " spindle	" spindle broken.
Maisonnette cor. Ontario	27	27	1 Rod straightened and new valve	Rod bent and valve worn out
Mackay above Dorchester	29	1	Put in a new hydrant	" broken in old hydrant.
" " "	30	1	" " valve	Old valve worn out.
Dorchester opp. St. Mark	30	4	Repacked valve	" packing worn out.
Albert near Felix	31	1	Took out hydrant	Not required.
St. Martin and St. Antoine	31	8	Replaced casing of valve	Taking away for repairs.
Notre Dame at Military Prison	31	4	Raised valve chamber	Below level of street.
Cor St. Urbain and Guillbault	30	6	" " "	" " " "
Knox and Hibernia st.	30	1	Renewed valve	Old one worn out.
Coleraine and Charlevoix	June	1	Put in a new valve	" " " "
Burnside cor. Peel	"	1	Recalked joint	Joint blown out by pressure.
St. Antoine cor. Aqueduct	"	1	" " "	" " " "
St. Urbain cor. Mignonne	"	1	" " "	" " " "
Fortier cor. St. Dominique	"	2	Straightened rod in hydrant	Bent from rough usage.
Mance cor. Milton	"	2	Put in a new valve	Old valve worn out.
Commissioners east of Bonsecrs	"	2	Renewed valve chamber	Was falling from decay.
St. James cor. Mountain	"	2	" " spindle	Old spindle bent.
Cor. Maisonneuve and Ontario	"	2	Put in a new piece of pipe	Broke driv a nozzle very thin
Cor. Frontenac and Logan	"	2	" " valve	Old one useless old age.
St. Martin cor. Notre Dame	"	2	Put in a new valve	Old one worn out.
Cadieux cor. Rachel	"	3	Straightened hydrant rod	Hydrant rod bent.
Colborne cor. Common	"	3	Eased valve	Valve stiff and hard to open.
Beaudry cor. St. Catherine	"	3	Put in new packing & 2 eye bolts	Old packing worn out.
Mountain cor. St. Antoine	"	5	Raised valve chamber to street level	Below street level.
Rozel and Charlevoix	"	5	Eased valve	Valve stiff.
Dufresne and St. Catherine	"	5		

Schedule No. 8a *Cont'd*—Showing the Repairs done to Main Pipes, Hydrants and Valves during year 1893.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Fullum and St. Catherine.....	June	5	12	1	Put in new gate.....	Old one out of repair.
Cadieux cor. Mignonne	"	5	4	1	Rebuilt valve chamber.....	Falling in from decay.
Dufresne or St. Catherine	"	6	6	1	Put in a new spindle.....	Old spindle broken.
Prince Arthur cor. Durocher	"	6	6	1	Repacked valve	" packing worn out.
Lincoln Ave.....	"	7	6	1	Put in a new valve	" valve worn out.
McGill cor. St. Paul	"	8	1	1	Straightened hydrant rod	Hydrant rod bent.
Dorchester near Seymour Ave.....	"	8	1	1	Put in a new valve	Old valve worn out.
Mon morency cor. Richardson...	"	9	1	1	" " "	" " "
Mill st. a Ogilvie.. ..	"	9	4	1	" " "	" " "
Opp. 460 Dorchester.. ..	"	9 10	1	1	Recaulked joint.....	Joint blown out by pressure.
Plessis cor. Lagachetiere... ..	"	9	6	1	Repacked valve.....	Old packing worn out.
Opp. 33 St. Rose	"	10	4	1	Recaulked joint.....	Joint blown out by pressure.
Craig cor. Victoria sq.....	"	10	1	1	Put on a new washer	Washer blown out by "
St. Dominique cor. Fortier.....	"	10	1	1	Put in a new valve	Old one worn out.
St. Rose cor. Maisonneuve	"	12	1	1	Replaced hydrant.....	" hydrant blown out.
Fulford cor. Notre Dame	"	12	1	1	Put in a new hydrant valve	" one worn out.
St. James and Fulford.....	"	12	6	1	Valve chamber rebuilt.....	" chamber decayed.
Drummond st at Rink	"	13	1	1	Put in a new valve	" one worn out.
Craig cor. Lacroix	"	13 12	1	1	Recaulked joint	Joint blown out by pressure.
St. Charles and Charlevoix	"	13	6	1	Rebuilt valve chamber.....	Chamber decayed.
Opp. 47 Hypolite.....	"	14	1	1	Straightened rod & put in new valve.....	Valve worn out & rod bent.
Ontario cor. Balmoral	"	14	1	1	Put in a new valve	Old one worn out.
St. James near G. T. R. Station.	"	14 12	1	1	Recaulked joint.....	Joint blown out by pressure.
Juror cor. Hermine	"	15	1	1	Put in a new valve	Old one worn out.
St. Dominique cor. Charbonneau	"	15	1	1	" " "	" " "
Cor. Sherbrooke & Alwater Ave.	"	16	1	1	" " "	" " "

Cor. St. James and Seigneurs.....	June	16	.....	.....	.....	1	Put in a new valve	.....	Old one worn out.
Notre Dame at Dow's Brewery ..	"	17	.....	.....	.....	1	"	.....	"
Visitation cor. Lagauchetière.....	"	17	.....	.....	.....	4	Repacked valve.....	.....	Packing worn out.
Opp. 6 Knox st.	"	17	6	.....	.....	1	Repacked joint.....	.....	"
Moreau st. cor. Stadacona	"	19	.....	.....	.....	1	Put in a new valve	.....	Old one worn out.
Opp. 75 Congregation.....	"	19	.....	.....	.....	1	"	.....	"
St. Catherine at No. 5 Fire Station	"	20	.....	.....	.....	1	"	.....	"
St. Antoine past Dominion	"	20	.....	.....	.....	4	New stuffing box and new spindle.....	.....	Spindle br. & pack'g.
" and Richmond sq ..	"	20	.....	.....	.....	4	Repacked valve	.....	Packing worn out.
Opp. 380 Panet st.	"	21	.....	.....	.....	1	Put in a new valve	.....	Old one worn out.
Hypolite above Sherbrooke	"	21	.....	.....	.....	1	Repaired hydrant chamber .....	.....	" chamber decaye
Robin cor. Visitation	"	22	.....	.....	.....	4	Repacked valve .....	.....	" packing worn on
Commissioners cor. J.-Cartier sq	"	22	.....	.....	.....	1	Put in a new valve	.....	" one worn out.
St. Antoine and Seigneurs	"	22	.....	.....	.....	6	"	.....	"
St. Catherine east of St. Phillip..	"	23	.....	.....	.....	1	"	.....	"
Cor. Craig and Visitation	"	24	.....	.....	.....	1	Put in a new valve	.....	Old one worn out
Donegani st.....	"	26	.....	.....	.....	1	"	.....	"
Cadioux cor. Ontario.....	"	26	.....	.....	.....	1	"	.....	"
Dorchester cor. Panet	"	27	.....	.....	.....	1	Recaulked joint on hydrant.....	.....	Joint blown out by l
Notre Dame and Richmond	"	27	.....	.....	.....	6	Repacked stuffing box.....	.....	Packing worn out.
St. Antoine cor. "	"	27	.....	.....	.....	4	"	.....	"
St. Famille 1st ab. Sherbrooke..	"	28	.....	.....	.....	1	Put in new hydrant valve	.....	Old one worn out.
Papineau south of Ontario	"	28	.....	.....	.....	1	"	.....	"
Opp. 117 St. Paul.....	"	29	.....	.....	.....	1	"	.....	"
Windsor cor. Dorchester.....	"	29	12	.....	.....	1	Recaulked joint.....	.....	Joint blown out by l
St-James and Fulford	"	30	.....	.....	.....	1	Put in a new valve.....	.....	Old one worn out.
Notre-Dame east of St. John	July	1	.....	.....	.....	1	"	.....	"
St. Louis cor. Berri.....	"	1	.....	.....	.....	1	Took out old hydrant.....	.....	Not used any more.
Seigneurs cor. Notre-Dame.....	"	1	.....	.....	.....	6	Rebuilt valve chamber.....	.....	Valve chamber decay
St. Antoine cor. St. Margaret.....	"	3	.....	.....	.....	6	Put in a new spindle .....	.....	Old one broken.
Richmond cor. Basin	"	3	.....	.....	.....	1	Put in a new valve	.....	Old one worn out.
St. Catherine cor. Closse.....	"	3	.....	.....	.....	4	Put in a new spindle .....	.....	Old one broken.
Seigneurs cor. Notre-Dame	"	3	.....	.....	.....	6	Rebuilt valve chamber.....	.....	Old chamber decaye
St. Peter cor. Commissioners.....	"	5	.....	.....	.....	1	Put in a new valve.....	.....	Old one worn out.
Guy at Grey Nunnery.....	"	5	.....	.....	.....	1	"	.....	"

Schedule No. 8a 'ont'd—Showing the Repairs done to Main Pipes, Hydrants and Valves during year 1893.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
Barré cor. McCord	July 5	5	4	1	Put in a new spindle.....	Old one broken.
Dalhousie Fire Station.....	" 6	6	1	1	Put in a new valve.....	" worn out.
Notre-Dame cor. Poupart	" 6	6	1	1	Repaired hydrant chamber.....	Hydrant chamber decayed.
Victoria sq.	" 7	7	4	4	Repacked valve.....	Old packing worn out.
St-Urbain below P. Arthur.....	" 7	7	1	1	Put in a new valve	Old one worn out.
Papineau cor. Dorchester.....	" 7	7	1	1	" "	" "
Ann south Brennan.....	" 7 4"	4"	1	1	Recaulked joint.....	Joint blown out by pressure.
Carleton road	" 7 12"	12"	1	1	Caulked joint	" "
Opp. 47 St. Rose.....	" 8 4"	4"	1	1	Put in a new piece.....	Pipe broke by settling of earth
Wellington cor. Charlevoix.....	" 10	10	1	1	" valve.....	Old one worn out.
Britannia cor. Reverside	" 10	10	4	4	" " stuffing box.....	" broken.
St. Rose cor. Visitation.....	" 10	10	1	1	" " rod.....	Rod broken by M. S. R. R. men
St. Catherine cor. Champlain. ...	" 11	11	1	1	" " "	" "
" " Wolfe.....	" 11	11	1	1	" " valve	Old one worn out.
" " Delorimier av.	" 12	12	1	1	" "	" "
Ontario cor. Moreau	" 13	13	1	1	" "	" "
Dorchester cor. Panel.....	" 13	13	1	1	Repaired hydrant chamber.....	Old chamber decayed.
Victoria sq.	" 13	13	12	12	Put in a new spindle.....	Old spindle broken.
St. James cor. St. Martin.....	" 14	14	1	1	" " valve	Old one worn out.
Fulford cor. St. Antoine.	" 15	15	1	1	" "	" "
Dorchester cor. Bleury.....	" 15	15	1	1	Lowered hydrant.....	Hydrant too high for street.
Opp. 470 Seigneurs	" 15 6"	6"	1	1	Recalked joint	Blown out by pressure.
William cor. McGill.....	" 17	17	1	1	Put in a new valve.....	Old one worn out.
Gain cor. Craig.....	" 18	18	1	1	" "	" "
St. Rose cor. Maisonneuve	" 18	18	1	1	" "	" "
Opp. 282 Aqueduct	" 18 4"	4"	1	1	Recalked joint	Joint blown out by pressure.

Dorchester cor. Alexander.....	July	19	.....	.....	Put in a new valve.....	Old one worn out.
St. Augustin corner Basin.....	"	19	.....	.....	Recaulked joint.....	Joint blown out by pressure.
Conde opp. Richardson.....	"	20	.....	.....	Put in a new valve.....	Old one worn out.
Aqueduct opp. Adeline.....	"	20	4"	.....	Recaulked joint.....	Joint blown out by pressure.
Lafontaine corner Visitation.....	"	21	.....	.....	Put in new packing.....	Old packing worn out.
Wolfe corner Robin.....	"	21	.....	.....	" " valve.....	Old one worn out.
Canning below St. Antoine.....	"	22	.....	.....	Replaced by another hydrant.....	Old hydrant split.
McMill and St. Paul.....	"	22	10	.....	Put in a new spindle.....	Old spindle broken.
Craig and Wolfe.....	"	22	6	.....	" " ".....	" " "
Shannon corner William.....	"	24	.....	.....	" " valve.....	Old one worn out.
Notre-Dame 2nd last East.....	"	25	.....	.....	" " ".....	" " "
Notre-Dame corner Montcalm.....	"	25	.....	4	" " spindle.....	Old one broken.
Inspector above St. Antoine.....	"	26	.....	.....	Put in a nut on rod.....	Old nut loose and no good.
Cor. Mance and Pine Ave.....	"	26	.....	.....	Put in a new valve.....	Old one worn out.
Lagauchetière corner Papineau.....	"	27	.....	.....	Put on new brasses.....	Old ones stolen.
Napoleon corner Cadieux.....	"	27	.....	.....	Put in a new valve.....	Old one worn out.
St. Catherine and St. Hubert.....	"	28	.....	.....	" " ".....	" " "
Dorchester corner St. Hubert.....	"	28	.....	.....	Repairing hydrant chamber.....	Old chamber decayed.
Opp. 132 German.....	"	28	.....	.....	" " ".....	" " "
Dominion corner St. James.....	"	29	.....	.....	Put in a new valve.....	Old one worn out.
Duluth corner Berri.....	"	31	.....	.....	" " ".....	" " "
Barre st. corner McCord.....	Aug.	1	.....	.....	" " ".....	" " "
Lagauchetière corner Cadieux.....	"	1	.....	.....	Renewing hydrant chamber.....	Hydrant chamber decayed.
Basin corner St. Augustin.....	"	2	.....	.....	Rebuilt ".....	" " "
Delormier Ave. cor. Lafontaine.....	"	2	.....	.....	Put in a new valve.....	Old one worn out.
Water corner Voligeurs st.....	"	3	.....	.....	" " ".....	" " "
Canning near Coursol.....	"	3	.....	.....	Rebuilt hydrant chamber.....	Hydrant chamber decayed.
Osborne opp. Stanley.....	"	4	.....	.....	Put in a new valve.....	Old one worn out.
Lagauchetière corner Campeau.....	"	4	.....	.....	Rebuilt hydrant chamber.....	Old one decayed.
Cor. Latour and St. Monique.....	"	4	.....	.....	Recaulked joint.....	Joint blown out by pressure.
Visitation corner Logan.....	"	5	.....	.....	Put in a new valve.....	Old one worn out.
Lagauchetière corner Berri.....	"	5	.....	.....	" " ".....	" " "
Versailles under G. T. R. track.....	"	6	4"	.....	Recaulked joint.....	Joint blown out by pressure.
Ann st.....	"	6	4"	.....	" " ".....	" " "
St. James West of St. Lawrence.....	"	7	.....	.....	Put in a new valve.....	Old one worn out.

[illegible]

Aug.	25	Put in new valve	Old one worn out.
"	25	"	"
"	26	"	"
"	26	Caulked joints on high level	Joint blown out by pressure.
"	28	Put in new hydrant valve	Old one worn out.
"	28	"	"
"	29	Repacked valve	" packing worn out.
"	30	Put in new valve	" one worn out.
"	30	"	"
"	31	" spindle	" spindle broke.
"	31	" valve	" one worn out.
"	31	"	"
Sept.	1	" spindle	" one stripped.
"	6	" valve	" one worn out.
"	2	Repaired hydrant well	Hydrant well decayed.
"	2	Recalculked joint	Joint blown out by pressure.
"	4	"	"
"	4	Put in new valve	Old one worn out.
"	4	"	"
"	5	" spindle	" one broken.
"	5	"	"
"	5	" valve	"
"	6	"	" worn out.
"	12	" stuffing box	" broken.
"	7	" spindle	"
"	8	" valve	" worn out.
"	9	" piece pipe	Settling of cut and pipe.
"	11	" hydrant valve	Old one worn out
"	12	"	"
"	12	Recalculked joint	Joint blown out by pressure.
"	13	" in tunnel	"
"	14	Put in a new hydrant valve	Old one worn out.
"	14	Joint recalculked	Blown out by pressure.
"	14	"	"
"	16	Put in a new hydrant valve	Old one worn out.

Schedule No. 8a *Cont'd*—Showing the Repairs done to Main Pipes, Hydrants and Valves during year 1893.

POSITION.	DATE.	Diameter.	Valves.	Hydrants.	HOW REPAIRED.	Probable cause of injury.
N-Dame opp. N-Dame Hospital	Sept. 16	.....	.....	1	Put in a new hydrant valve.....	Old one worn out.
Cor. Dorchester and Drummond	" 16	4" .....	.....	1	" " piece of pipe.....	Pipe broken by settling of cut
Manufacturers cor. d'Argenson..	" 19	.....	.....	1	" " hydrant valve.....	Old one worn out.
Albert cor. Fulford	" 19	.....	.....	1	" " "	" abandoned.
Sherbrooke cor. Aylmer.....	" 20	.....	.....	1	" " " valve	" worn out.
Opp. 44 Aylmer.....	" 20	4" .....	.....	1	Recaulked joint.....	Joint blown out by pressure.
Craig cor. Wolfe	" 21	.....	.....	1	Put in a new hydrant valve.....	Old one worn out.
Vitre cor. Cadieux	" 21	.....	.....	1	" " "	" " "
Coursol east Dominion.....	" 22	.....	.....	1	" " "	" " "
1013 St. James	" 22	4" .....	.....	1	Recaulked joint.....	Joint blown out by pressure.
Colborne cor. Wellington	" 22	4" .....	.....	1	" " "	" " "
Fort cor. St. Catherine	" 23	.....	.....	1	Put in a new valve	Old one worn out.
Opp. 24 Capital st.....	" 25	4" .....	.....	1	Recaulked joint.....	Joint blown out by pressure.
St. Lawr'ce opp. St. Lawr'ce Mkt	" 27	.....	.....	1	Put in a new hydrant valve	Old one worn out.
Champ de Mars cor. Bonsecours	" 27	4" .....	.....	1	" " valve	" " "
Ann st. south of Brennan.....	" 27	4" .....	.....	1	Recaulked joint.....	Joint blown out by pressure.
Cadieux st. below Vitre.....	" 28	.....	.....	1	Put in a new hydrant valve	Old one worn out.
Notre Dame cor. Bonsecours	" 29	.....	.....	4	Repacked valve	Packing worn out.
Dorchester cor. Bronson's Lane ..	" 29	.....	4	1	" " "	" " "
Notre Dame cor. Wood Yard.....	" 30	.....	.....	1	Repaired hydrant rod	Rod broken by rough usage
Opp. 35 Hushbrooke.....	" 30	.....	.....	1	Put in a new hydrant valve	Old one worn out.
" 35	" 30	.....	.....	1	" " tile drain.....	" broke.
Guy above St. James	" 30	4" .....	.....	1	Recaulked joint.....	Joint blown out by pressure.
Belmont cor. Beaver Hall	Oct. 2	.....	.....	1	Put in a new hydrant valve	Old one worn out.
Logan cor. Dufresne st.....	" 3	.....	.....	1	" " "	" " "
Richmond cor. Grand Trunk	" 3	.....	.....	1	" " "	" " "

Dame and Mountbatten	3	10	Hydrant valve chamber	Old one decayed
Lusignan cor. Richmond	5	10	Put in new hydrant valve	worn out.
Cadieux above Notre Dame	6	10	" "	split.
Cadieux above LaGauchetière	9	10	" "	worn out.
Itashbrooke st.	10	10	" "	" "
M-Cord and Ottawa	10	10	" "	" "
Peel 1st above Sherbrooke	11	10	" "	" "
Notre Dame cor. Wolfe	12	10	" "	" "
St. Justin cor. St. Catherine	12	4	in a new spindle	Old spindle broken.
King st. south Wellington	13	4	on iron band	Sand hole in pipe.
Charlevoix cor. Rozel	14	10	in a new hydrant valve	Old one worn out.
Parthenais 1st above Ontario	14	10	" "	" "
Opp. 437 St. Lawrence	14	10	Recalked joint	Joint blown out by pressure.
" 88 Chenneville	17	4	Put in a new piece of pipe	Pipe broken by old age.
McGill cor. Notre Dame	18	8	" "	Old one worn out.
Cor. William and Ottawa	19	10	hydrant valve	" "
McTavish cor. Sherbrooke	20	10	" "	" "
Chenneville near Dorchester	20	6	piece of pipe	Pipe split by pressure.
Grand Trunk and Richmond	21	10	hydrant valve	Old one worn out.
St. Felix cor. St. James	21	10	" "	" "
Little St. Antoine	21	10	" "	" "
Ontario cor. Maisonneuve	23	10	" "	" "
McGill cor. Notre Dame	23	10	" "	" "
" " St. Paul	24	10	another hydrant	Brasses broken.
Opp. 14 Farm st	24	4	Recalked joint	Joint blown out by pressure.
Papineau Ave above Ontario	25	10	Put in a new hydrant valve	Old one worn out.
Seigneurs cor. St. James	25	10	" "	" "
St. Patrick cor. St. Etienne	26	10	" "	" "
St. Etienne opp. G.T.R. offices	26	10	" "	" "
Notre Dame cor. Wood Yard	27	10	" "	" "
St. Etienne opp. Stock Yard	27	10	Recalked joint	Joint blown out by pressure.
Opp. 109 Visitation	27	4	Put in a new hydrant valve	Old one worn out.
St. James cor. Cathedral	28	10	" "	" "
Seigneurs cor. St. Antoine	28	10	" "	" "

Opp. 2217 St. Catherine.....	Nov.	14	6"	...	...	Recaulked joint	Joint blown out by pressure.
Notre Dame cor. Versailles	"	15	.....	1	...	Changed to a patent hydrant.....	faper hydrant taken out.
Colborne south Wellington.....	"	16	.....	1	...	" " 3 nozzle "	Old one taking out.
Opp. 509 Grand Trunk st.....	"	17	.....	1	...	Put in a new hydrant valve.....	" worn out.
Conde and Centre	"	17	.....	4	...	Valve reshipped.....	Unshipped valve.
Frontenac above Ontario	"	18	.....	...	...	Put in new hydrant valve	Old one worn out.
Chatham below R R. Truck	"	18	.....	...	...	Put in a new hydrant	" no use.
Colborne cor. Wellington	"	18	.....	6	...	Repacked stuffing box	Stuffing box worn out.
Graig cor. St. Hubert.....	"	20	.....	1	...	Put in a new hydrant valve.....	Old one worn out.
McTavish cor. Sherbrooke	"	20	20"	...	...	Joint recaulked	Joint blown out by pressure.
Duke and William	"	20	.....	6	...	Taking out valve	Old valve useless
Sherbrooke cor. St. Dominique ..	"	21	.....	...	...	Put in a new hydrant valve.....	" one worn out.
Dorchester cor. Beaudry.....	"	22	.....	1	...	" " "	" " "
" " Windsor	"	22	.....	4	...	Repacked valve	" packing worn out.
St. Etienne and St. Patrick.....	"	22	.....	6	...	Put in new valve	" one worn out.
Inspector cor. St. Antoine	"	23	.....	1	...	" " hydrant valve.....	" " "
Peel near Pine Ave.....	"	24	.....	1	...	" a new rod	" one broken.
Opp. 26 St. James	"	24	4"	...	...	Recaulked joint	Joint blown out.
St. Dominique cor. Napoleon.....	"	24	.....	4	...	Put in a new valve	Old one broken.
St. Catherine cor. Bishop	"	25	.....	1	...	" " hydrant valve.....	" worn out.
Bleury above Dorchester st.....	"	25	.....	1	...	" " "	" " "
Lagauchetière cor. Alexander ..	"	27	.....	1	...	" " "	" " "
Opp. 86 Shearer	"	27	6"	...	...	" " piece.....	Pipe broken by age.
Aqueduct near Dorchester.....	"	27	4"	...	...	Itcaulked joint	Joint blown out by pressure.
Peel st. near Pine Ave	"	28	.....	1	...	Put in a new hydrant valve.....	Old one worn out.
Parthenais st. cor. Ontario	"	28	.....	1	...	" " "	" " "
Dorchester west Bleury	"	28	10"	...	...	Recaulked joint	Joint blown out by pressure.
Plessis cor. Logan	"	29	.....	1	...	Put in a new hydrant valve.....	Old one worn out.
Cadieux above Hoy st.....	"	29	16"	...	...	" " new length 16" pipe.....	Defective pipe.
St. Bernard cor. Bleury.....	"	29	.....	4	...	Repacked valve.....	Packing worn out.
Colborne near Wellington	"	29	6"	...	...	Itcaulked joint	Joint blown out by pressure.
Laval Ave 1st above Rachel	"	30	.....	1	...	Put in a new valve	Old one worn out.
Commissioners cor. J.-Cartier sq.	"	30	6"	...	...	Itcaulked joint.....	Joint blown out by pressure.
Opp. 143 St. Dominique	"	30	4"	...	...	Put in a new piece of pipe.....	Pipe burst from old age.
Hutchison cor. Prince Arthur ...	Dec	1	.....	1	...	" " hydrant valve	(Old one worn out.

**SCHEDULE No 9—SHOWING THE DIFFERENT KINDS AND SIZES
OF METERS BELONGING TO THE CITY AND TO PRIVATE
PARTIES FOR THE YEAR 1893.**

KINDS.	SIZES in inches.	Property of the City.				Private property.				
		In the City.	Outside the City.	At the work Shops.	Total.	In the City.	Outside the City.	At the work Shop.	Total.	Grand total.
Gem.....	10			2	2					2
".....	6	4	1	1	6	4			4	10
".....	4	17		6	23	5			5	28
".....	3	68		5	73	9			9	82
".....	2	29		3	32	5			5	37
".....	1½	6		4	10	2			2	12
Union.....	2					1			1	1
".....	1	7		9	16					16
".....	¾	16		14	30	2			2	32
Rotary Union...	1½	2			2					2
Crown.....	6	2			2	3	2		5	7
".....	4	19	1	1	21	6			6	27
".....	3	23	1		24	3			3	27
".....	2	23	2		25	5			5	30
".....	1½	21		1	22	3			3	25
".....	1	47		3	50	5			5	55
".....	¾	41		7	48	5			5	53
".....	2	117		11	128	4			4	132
Empire.....	2	10			10					10
".....	1	30		6	36	1			1	37
".....	¾	6			6					6
".....	2	81		3	84					84
Worthington...	4					1			1	1
".....	3	1		1	2					2
".....	2	10			10	5			5	15
".....	1½	13			13	1			1	14
".....	1	38	1	9	48					48
".....	¾	61		1	62	3			3	65
Hersey.....	1			2						2
".....	¾	5		5	10					10
		698	6	94	798	73	2	0	75	873

Gem

Union

Rotary
Crown

Empire

Worthing

Hersey

St. Ann's War

Barré
Basin

SCHEDULE No. 10.—SHOWING THE PIPES, &c.—Continued.

NAME OF STREETS.	Length in feet of cast iron pipes.							No. of Valves.							Hydrants.	Houses Supplied.			
	24"	20"	16"	12"	10"	8"	6"	4"	Total.	24"	20"	16"	12"	10"			8"	6"	4"	Total.
St. Antoine W' rd.—Continued.																			
Brought forward																			
Cathedral						370	134	4	133	641			2					2	17
Chaboulez Square						389			2	391			1				1	2	8
Chatham						3	37	3		43					1			1	1
Chomedy																			1
Cloase																			1
Concord							763			763					2			2	2
Crescent																			2
Craig									50	50								1	1
Dorchester									14	14								1	1
Drummond																			1
Fort						3	60	6	3	72					2			3	10
Fulford																			2
Guy									16	16								1	1
Hanover																			2
Inspector																			1
Lagauchetiere						316	72	3	27	418			1					1	17
Lusignan																			6
McGregor																			3
McGill College Avenue																			6
Metcalfe									9	9									3
Mountain							4			4									1
Notre-Dame																			4
Osborne																			2
Peel																			4
Phillip Square																			4
Pine Avenue																			2
Pacific Avenue																			1
Reepath																			2
Richmond																			2
St. Anthony																			2

[illegible]

St. Lawrence Ward.

[illegible]

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100																																																																																																			
James Ward	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300

mes Ford.

Notre-Dame.....	1427	20	18	1858	45	22	3386	1	1	1	11	2	10	7	55
Ontario.....															1
Perthuis.....															1
Rousseau.....			120				130		1				3		3
Roy.....															4
Rivard.....															13
Sherbrooke.....			1093	33			1736		2			1	3	6	2
St. André.....			120	60	2		182				1		1		20
St. Catherine.....															12
St. Christophe.....															4
St. Denis.....				43					1		1		1		48
St. Hubert.....															12
St. Louis.....															6
Visitation.....															33
Wolfe.....			8	63	6		72			1			1		3
Jacq.-Cartier.....															25
Ernest.....			34	7			41			1			1		1
Lacroix.....															1
Robillard.....															12

St. Louis Ward.

Albina.....	1427	20	3457	800	2188	86	30	8008	1	1	11	8	14	3	36	20	409
Cadieux.....			4066	13	250	6	43	4387									1
Côté Lane.....										11	2	6		3	22	11	56
Drolet.....																	3
Dubord.....																	26
German.....																	4
Lagauchetière.....																	7
Laval Ave.....																	2
Napoléon.....				1	24		2	27				1		1			4
Pantaléon.....			30	2455	30	20	2456		2	3	1			6	2		26
Pine Avenue.....																	3
Roy.....			61	38			99										2
Sanguinet.....																	2
Sherbrooke.....			2419	18		16	2443		2								19
St. Catherine.....													1	3	6	5	4
St. Denis.....																	28
St. Dominique.....																	4
St. Elizabeth.....																	22
St. Hypolite.....			1979		69		52	2100		4	1			1	6	5	9
St. Lawrence.....																	...
Carried over.....			8025	82	2893	36	133	11669		17	5	12	1	5	40	34	225

SCHEDULE No. 10—SHOWING THE PIPES, &c—Continued.

[illegible]

Schedule No. 12—Showing the average pressure in City Mains during the year 1893.

MONTHS.	Height above datum.	At W. W. Shop, Laguna- chellere st., corner St. Chs. Hor.														Fire Station No. 16, Rachel Street.	Surface of water in McTavish Reservoir.
		Central Fire Station, Craig Street.	Fire Station No. 2, St. Gabriel Street.	Fire Station No. 3, Wellington Street.	Fire Station No. 4, Chaboulier Bqr.	Fire Station No. 5, St. Catherine Street.	Fire Station No. 6, Ontario Street.	Fire Station No. 7, Dalhousie Bqr.	Fire Station No. 8, Craig Street.	Fire Station No. 9, Centre Street.	Fire Station No. 10, St. Catherine Street.	Fire Station No. 11, Ontario Street.	Fire Station No. 12, Selgneurs Street.	Fire Station No. 13, Desery Street.	Fire Station No. 14, St. Dominique Street, St. J. Bte. Ward.	Fire Station No. 15, Hibernia Street.	
January	70	66	77	80	59	63	58	73	82	31	57	78	76	112	80	203.55
February	70	67	77	71	59	62	59	71	83	32	57	77	74	113	78	204.20
March	70	66	79	73	60	62	58	71	73	34	57	75	74	110	76	204.73
April	70	72	80	79	61	63	59	71	77	33	57	75	74	104	77	203.95
May	70	72	87	80	76	60	59	71	78	34	58	80	73	101	78	204.49
June	70	73	87	79	76	60	59	71	78	34	58	80	73	101	81	204.84
July	70	73	87	79	79	60	59	71	77	34	57	80	73	101	83	203.53
August	70	73	86	80	78	59	61	70	77	34	57	80	69	103	79	203.87
September	70	73	86	80	75	59	62	71	77	34	57	80	69	103	80	204.11
October	70	73	87	80	77	58	62	71	77	34	57	80	69	103	80	203.56
November	70	73	89	76	64	61	61	71	80	34	57	80	68	102	74	203.28
December	70	73	82	70	57	61	61	71	84	34	58	80	65	102	74	204.32
verage 1893.	70	65	79	75	63	62	58	71	79	33	57	79	66	106	76	203.99
" 1892.	70	66	79	80	49	64	58	71	82	31	60	77	75	112	80	203.96

† No. 10 Fire Station now on high level.

SCHEDULE No. 13.

SHOWING THE POSITION OF PUBLIC FOUNTAINS ERECTED IN THE CITY OF MONTREAL
UP TO JANUARY 1894.

No.	LOCATION.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Drinking Troughs.	Number of Jets.
1	Beaver Hall Square.....				1			1
2	Belle Rive Park.....	1			1			2
3	Bonsecours Market.....							2
4	Chabouillez Square.....						1	
5	Cherrier Square.....				2			6
6	Colborne at Flour Shed.....				1		1	2
7	Court House Square.....	2	1	2				5
8	Craig at Victoria Square.....			1				2
9	Craig opposite Drill Hall.....						1	1
10	Custom House Square.....				1			1
11	Dorchester at Dominion Square.....				1		1	1
12	Dufferin Square.....				1		1	1
13	Fulford near Notre-Dame.....				1		1	1
14	Guilbault and St. Lawrence.....				1		1	1
15	Jacques Cartier Square and St. Paul.....	1			1		1	5
16	Inspector at Hay Market.....						1	1
17	McTavish street opposite Reservoir.....				1			1
18	McGill and Common.....			1				2
19	Mill street at Waste Weir.....					1		2
20	Mount-Royal Avenue.....						1	1
21	Notre-Dame near Ruisseau Migeon.....						1	1
22	Notre-Dame and Poupart.....				1		1	1
23	Ontario opposite Reformatory grounds.....					1		2
24	Ontario near Papineau.....						1	2
25	Ottawa corner Dalhousie.....						1	2
26	Papineau north of Sherbrooke.....					1		2
27	Papineau Square.....		1			1		7
28	Park Avenue and Duluth.....							2
29	Phillip's Square.....				1			1
30	Phillip's Square and St. Catherine.....						1	1
31	Prince and Common.....				1			2
32	Rachel and Champlain.....				1		1	1
33	Richmond Square.....				1		1	1
34	Seigneurs and William.....				1		1	1
35	Sherbrooke near Drummond.....		1					1
36	Sherbrooke corner Guy.....		1					2
37	St. Ann's Market.....					2		2
38	St. Antoine Market.....				1		1	2
39	St. Catherine and Western Park.....							2
40	St. Catherine and Delorimier.....					1	1	2
41	St. Gabriel Market.....					1	1	2

SCHEDULE No. 13.—*Continued.*

No.	LOCATION.	Cast Iron Basins.	Stone and Cement	Stone Fountains.	Cash Iron Fountains.	Wood Fountains.	Cast Iron Drinking Troughs	Number of Jets.
42	St. Louis Square.....	1			2			9
43	St. Patrick and Richmond.....				1		1	1
44	St. Patrick and Napoleon.....				1		1	1
45	St. Patrick and Wellington.....				1		1	3
46	St. Thomas and Ottawa.....				1		1	1
47	Victoria Square South of Craig.....		1	2				6
48	Victoria Square North of Craig.....	3						4
49	Viger Square Basin No. 1.....		1					1
50	Viger Square Basin No. 2.....	3						9
51	Viger Square.....				1			2
52	Wellington and Centre.....	1			1			2
53	Wellington and Magdalen.....				1		1	1
54	Western Park.....	2	1					5
55	St. Patrick's Square.....	2						2
56	Dalhousie Square.....	2						1
	Place D'Armes: De Maisonneuve monument not completed.							

No.	LOCATION.	Road Watering Nozzles.	Cast Iron Fountains.	Wood Fountains.	Cast Iron Cattle Drinking Troughs	Number of Jets.
	Distributed through Mountain Park.					
1	High Level Reservoir.....		1			1
2	Foot of Elevator.....		1		1	1
3	Alongside Molson's Fence.....			1		1
4	Above Golf Club House.....			1		1
5	Park Road, North of Elevator.....	3	10			3
6	Park Road, running west side Hall's property.....			1		1
7	Park Avenue opposite Duluth.....	1			1	2

SCHEDULE No. 13.—*Continued.*

No.	LOCATION. Distributed along the Wharves.	Hood Watering Nozzles.	Cast Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals.	Number of Jets.
1	Wind-Mill Point.....	.....	6	1	1	1	3
2	Allan's Wharf.....	.....	1	.....	.....	1	2
3	Allan's Shed.....	.....	.....	.....	1	.....	2
4	Opposite Custom House.....	.....	.....	.....	.....	1	2
5	King's Basin.....	.....	1	.....	.....	.....	1
6	Dominion Line.....	.....	.....	.....	1	1	3
7	Foot of Jacques Cartier Square.....	.....	1	.....	.....	.....	1
8	Foot of St. Gabriel St.....	1	.....	.....	.....	.....	1
9	St. Helen's Island Ferry.....	.....	.....	.....	.....	.....	1
10	Beaver Line.....	.....	.....	1	1	1	3
11	Donaldson Line, foot of Grant St.....	.....	.....	.....	.....	1	1
12	Commissioners, East of Berri.....	1	.....	.....	.....	.....	1
13	Longueuil Ferry.....	.....	.....	.....	.....	1	2
14	Foot of Marlborough St.....	.....	.....	.....	.....	1	2
15	Foot of Dezery St.....	.....	.....	.....	.....	1	2
16	West of Gale St.....	.....	.....	.....	.....	1	2

STATE OF NEW YORK.

COMMISSIONERS OF THE LAND OFFICE.

IN SENATE,

No.

42
43
44
45
46
47
48
49
50
51
52
53
54
55
56

1855 22
2206 42
3 09
200 34
76 17
202 50
200 38
87 50
3535 43

154 67
25 64
200 34
98 87
48 30
742 42
22 40
457 86
1835 40

30 43
109 14
509 70
28 75
9412 39
25272 77
30 00
52 00
1688 33
94 75
1079 99
45419 25

242 00

160 91

51192 99

SCHEDULE No. 14.

DETAILED STATEMENT OF EXPENDITURE FOR THE YEAR 1893.—*Continued.*

	\$	cts.	\$	cts.	\$	cts.
Brought over.....					51192	99

RESERVOIRS.

Repairs to dwellings	20	35				
Repairs to banks and walls.....	104	23				
McTavish shovelling snow.....	69	00				
High Level Watching.....	614	74				
Fuel.....	56	95				
Arc Light	172	07				
Telephone service	37	40				
Sundries.....	11	57				
					1086	31

ENGINE HOUSE H. L.

Wages.....	1342	22				
Fuel for engine.....	4778	18				
Supplies	454	87				
Repairs to machinery & boilers.....	347	19				
Telephone service.....	50	00				
Girders round store room &c.....	50	94				
Sundries.....	27	60				
					7051	00

DISTRIBUTION PIPES.

Repairs to mains, services and valves.....	17054	77				
Thawing pipes.....	23647	63				
Inspecting pipes.....	2355	15				
Iron castings &c.....	146	58				
Wood, planks, &c.....	1031	33				
Brick, cement, &c.....	17	76				
					44253	21

METER DEPARTMENT.

Inspecting	2358	15				
Repairing &c.....	1550	79				
					3908	94

Carried.....					107492	45
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DETAILED STATEMENT

1993.—Continued.

AQUEDUCT.

	\$	cts.	\$	cts.
Repairs to fences, gates and appurtenances			107	42 43
Repairs to bridges				
Cleaning ditches, &c				
Dam				
Sundries				
Ass't guardian's salary				
Police service			6	25 62
Cutting weeds				

WHEEL HOUSE.

Repairs to buildings				
" to machinery				
Fuel				
" for dwellings				
Grounds round the buildings			14	28 66
Supplies				
Telephone service				
Light & sundries				

ENGINE HOUSE.

Repairs to boilers				
" to machinery				
" to engine and boiler				
Repairs to coal shed			12	56 93
Wages				
Coal for steam				
Rent for land				
Telephone service				
Supplies				
Light and sundries				
Putting out fire in coal				

SPECIAL APPR. FOR

Over coats for inspectors

PIPE TRACK.

Repairing valves &c

Carried

140373 58

SCHEDULE No. 14.

STATEMENT OF EXPENDITURE FOR THE YEAR 1893.—Continued.

	\$	cts.	\$	cts.	\$	cts.
Brought over.....					140373	58
SHOP ON DÉSIRÉ ST.						
.....	816	00				
.....	23	06				
..... service	50	00				
					889	06
MACHINE SHOP.					27	00
STAFFS' SALARIES.						
.....	1114	00				
..... engine houses	7600	00				
.....	600	00				
.....	900	00				
					20214	00
MISCELLANEOUS.						
..... agencies for office.....					1188	94
..... keep Superintendent	400	00				
..... " foreman	350	00				
..... " Sally	200	00				
					950	00
..... taxes					354	42
					23623	42
PIPE LAYING.					163997	00
.....	108383	63				
..... lead, zinc &c.....	6342	13				
..... pipes	3900	44				
..... brass works	2045	81				
..... cord wood, &c	5830	98				
..... sand, clay, &c	3090	30				
..... castings	25967	90				
..... ware, packing &c.....	2873	91				
.....	3125	90				
					161561	00
Carried over.....					163997	00

SCHEDULE No. 14.

DETAILED STATEMENT OF EXPENDITURE FOR THE YEAR 1893.—*Continued.*

	\$	cts.	\$	cts.	\$	cts.
Brought over.....	161561	00	163997	00		
<i>PIPE LAYING.—Continued.</i>						
Cast iron pipes.....	91617	31				
Wrought iron pipes.....	62	30				
Valves and service stones.....	118	00				
Sundries.....	3124	44				
Rock excavation in St. J. Bte ward	73	75				
Carting pipes.....	2465	98				
Coal.....	635	86				
Repairing streets.....	3337	71				
			262996	35		
New engine	2010	70				
Suction pipe	1789	87				
			3800	57		
					266796	92
Grand Total.....					430793	92

SCHEDULE No. 15.—INVENTORY.

INVENTORY OF STOCK ON HAND, JANUARY 1894.

DESCRIPTION.	24"	20"	16"	12"	10"	8"	6"	4"	2½"	1½"
Cast iron pipes (new) feet	2018	865	239	2623	956	2954	684	621	396	441

DESCRIPTION.	30"	24"	20"	16"	12"	10"	8"	6"	4"
Stop valves		1	3	2	9	2	2	11	1
Slip sockets	2	3	2	4	29	35	38	58	25
Cast iron caps			23	16	87	65	79	23	27
Cast iron plugs	34	16	33	16	23	32	6	62	63
Cast iron double bends					24	36	25	10	53
Cast iron ½ bends					38	52	1	14	11
Cast iron ¾ bends					15	12	31	41	42
Cast iron sweeps	3	4	11	9		0			
Radial sockets 20°	9	3	10	8	15	25	22		
Radial sockets 10°	9	3	8	10		48	16		

CROSSES.

30 x 30	30 x 24	30 x 20	30 x 12	30 x 6	30 x 4	24 x 24	24 x 16	24 x 12	24 x 8	20 x 16
1	1	2	5	2	1	5	4	6	2	1

20 x 12	20 x 6	16 x 16	16 x 12	12 x 12	12 x 10	12 x 8	12 x 6	10 x 16	10 x 8	10 x 6
5	1	3	4	59	7	7	14	10	19	16

10 x 4	8 x 8	8 x 6	8 x 4	6 x 6	4 x 4
8	44	7	6	21	8

TEES.

30 x 24	30 x 12	30 x 6	30 x 4	24 x 12	24 x 6	24 x 4	20 x 12	20 x 8	20 x 4	16 x 12
2	7	1	6	12	9	13	17	2	5	2

16 x 10	16 x 6	16 x 4	12 x 12	12 x 10	10 x 10	10 x 8	10 x 6	10 x 4
22	3	2	1	8	12	22	1	2

SCHEDULE No. 15.—INVENTORY.—*Continued.*

TEES.

8 x 8	8 x 6	8 x 4	6 x 6	6 x 4	4 x 4
5	18	4	7	3	16

TAPERS.

30 x 24	24 x 20	24 x 16	20 x 16	16 x 12	12 x 10	20 x 12	12 x 8	12 x 6	12 x 4	10 x 8
5	1	3	6	7	12	5	29	32	50	4

10 x 6	10 x 4	8 x 6	8 x 4	6 x 4
23	15	19	14	38

BREECHES PIPES.

40 x 40	30 x 30	30 x 24	24 x 24	20 x 20	16 x 16	12 x 12	10 x 10	8 x 8	6 x 6
2		1	3	2	3	2	6	5	4

CASTINGS FROM 3" TO 1½"

CROSSES.

3 x 3	3 x 2½	3 x 2	3 x 1½
12	11	12	12

ELBOWS (Square).

ELBOWS ½ SWEEP.

3"	2½"	2"	1½"	3"	2½"	2"	1½"
24	26	37	6	24	26	54	1

SCHEDULE No. 15.—INVENTORY.—*Continued.*

CASTINGS FROM 3" TO 1½"

DOUBLE BENDS.				BONNETS.		
3"	2½"	2"	1½"	3'	2½"	2"
6	6	6	6	2	16	15

PLUGS.				SOCKETS.			
3"	2½"	2"	1½"	3"	2½"	2"	1½"
23	17	17	33	48	54	47	42

New hydrants (5 noz).....	8	Street watering nozles (brass).....	713
Cast iron fender post.....	1	Hydrant nozles (brass).....	9
Assorted valve covers.....	25	Assorted spindles.....	35
Hydrants already used.....	10	Rods for stop cocks (assorted)	10
3 Nozel hydrants	3		

1" pneumatic stop cocks..	13	2" iron pipe in feet	140
¾" " " "	17	1½" " "	105
¾" " " "	128	1" " "	280
¾ way " " "	14	¾" " "	210
2" ground cocks	3	201 rolls 1" lead pipe in lbs....	48240
1" " "	66	117 " ¾" " "	23257
¾" " "	91	138 " ½" " "	20317
¾" " "	78	Pig lead in pounds (258) brass.	20510
1" nozles	10	Ingot tin in pounds	405
¾" "	255	¾" copper tubing in pounds	694
¾" "	61	¾" iron boxes.....	5
1 x 58 tees	31	Footpath plates complete	430
¾ y.....	7	Cast iron caps for tube boxes ...	125
Assorted covers for boxes	273		

JOHN FALLON,

Foreman at Shop.

SCHEDULE No. 16.

Dwellings, stores, shops, offices, warehouses, manufactories, hotels, &c.,
in the City of Montreal, for the year 1893-4 with the assessed
water rates thereon :

DWELLINGS.

Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.
\$				\$				\$			
1 50	12	8	4	42361	40381	1980		45204	43107	2097	
2 25	1666	1521	145	20 25	24	22	2	43 50	5	5	
3 00	3348	3173	175	21 00	131	124	7	45 00	155	150	5
3 75	5265	5016	249	21 75	5	5		48 75	80	79	1
4 50	6794	6556	238	22 50	704	672	32	52 50	94	93	1
5 25	5661	5506	155	23 25	8	8		56 25	61	61	
6 00	4151	3988	163	24 00	214	204	10	60 00	68	68	
6 75	1624	1552	72	24 75	9	8	1	63 75	8	8	
7 50	3160	2998	162	25 50	156	153	3	67 50	28	28	
8 25	545	529	16	26 25	208	198	10	75 00	32	31	1
9 00	2341	2213	128	27 00	208	203	5	82 50	7	7	
9 75	773	722	51	27 75	2	2		90 00	29	28	1
10 50	1155	1088	67	28 50	60	58	2	93 75	1	1	
11 25	1239	1174	65	30 00	434	41	19	97 50	3	3	
12 00	862	819	4	31 50	73	73		105 00	11	11	
12 75	157	151	6	33 00	30	29	1	12 50	4	4	
13 50	736	696	40	33 75	205	195	10	120 00	1	1	
14 25	89	84	5	34 50	13	13		127 50	1	1	
15 00	847	787	60	35 25	1	1		135 00	7	7	
15 75	383	365	18	36 00	29	29		150 00	1	1	
16 50	403	357	46	37 50	232	218	14	225 00	1	1	
17 25	100	91	9	39 00	2	2		262 50	1	1	
18 00	428	410	18	40 50	2	2		375 00	1	1	
18 75	324	293	31	41 25	86	85	1				
19 50	298	284	14	42 00	7	7					
	42361	40381	1980		45204	43107	2097		45803	43697	2106

SCHEDULE No. 16.—Continued.

STORES, SHOPS, OFFICES, ETC.

Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.	Rate.	Assessed.	Tenanted.	Vacant.
				\$				\$			
4 00	1213	1034	179		8166	7279	887		8849	7941	908
5 00	852	749	103	32 00	37	36	1	122 00	15	15	
6 00	1685	1488	197	34 00	132	125	7	130 00	5	5	
7 00	485	435	50	36 00	13	12	1	142 00	10	10	
8 00	684	604	80	38 00	64	59	5	146 00	1	1	
9 00	215	209	6	40 00	3	3		152 00	3	3	
10 00	748	654	94	42 00	94	92	2	154 00	1	1	
11 00	101	97	4	46 00	24	24		162 00	4	4	
12 00	374	340	34	48 00	1	1		182 00	6	6	
13 00	52	49	3	50 00	67	65	2	194 00	1	1	
14 00	423	390	33	52 00	3	3		202 00	6	6	
15 00	20	20		54 00	23	23		242 00	3	3	
16 00	165	152	13	55 00	1	1		258 00	1	1	
17 00	44	42	2	58 00	23	23		290 00	1	1	
18 00	331	296	35	62 00	41	41		322 00	2	2	
19 00	5	5		63 00	2	2		342 00	1	1	
20 00	130	121	9	66 00	28	26	2	402 00	1	1	
21 00	5	5		70 00	8	8		442 00	1	1	
22 00	233	216	17	74 00	30	30		482 00	1	1	
23 00	2	2		78 00	2	2		570 00	1	1	
24 00	42	39	3	79 00	1	1		584 00	1	1	
25 00	6	6		82 00	37	36	1	602 00	1	1	
26 00	196	179	17	90 00	9	9		642 00	1	1	
27 00	1	1		98 00	8	8		802 00	1	1	
28 00	43	42	1	102 00	21	21					
29 00	1	1		106 00	1	1		1506 00	1	1	
30 00	105	98	7	110 00	1	1					
31 00	5	5		114 00	9	9					
	8166	7279	887		8849	7941	908		8918	8010	908

SCHEULUE No. 16.—Continued.

Horses.		Cows.		Horse stalls.		Urinals.		Water closets.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
	\$		\$		\$		\$		\$
6993	2 00	900	1 00	425 433	1 00 2 00	1114 30 98 7	1 00 1 50 3 00 15 00	105 4848 8	3 00 4 00 15 00
6993		900		858		1249		4961	

SPECIAL RATES.

Bakeries.		Beer Bottlers.		Fountains.		Steam Engines.			Sundries.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse power	Total.	No.	Rate.
	\$		\$		\$					\$
1	3 00	3	3 00	2	3 00	2	1	1	4	3 00
27	5 00	7	5 00	2	4 00	14	1	14	19	5 00
2	6 00	2	10 00	4	5 00	4	11	6	22	6 00
3	7 00	1	12 0	1	6 00	16	2	32	1	7 00
3	8 00	1	15 00	2	7 00	8	3	24	1	8 00
12	10 00			1	9 00	13	4	56	5	10 00
7	12 00			6	10 00	6	5	30	1	13 00
9	15 00			4	15 00	2	6	12	2	15 00
2	18 00			1	17 00	4	7	28	1	20 00
4	20 00			1	31 00	5	8	40	1	25 00
1	23 00			1	45 00	2	9	18	1	30 00
1	25 00					2	10	20	2	50 00
1	27 00					1	11	11	1	750 00
	30 00					2	12	24		
						2	13	26		
						1	14	14		
						3	15	45		
						1	16	16		
						3	20	60		
						1	25	25		
						1	34	34		
						1	50	50		
76		14		25		94		586	61	

SCHEDULE No. 16.—*Continued.*

HOTELS AND TAVERNS.

Rate.	Assessed.	Tenanted.	Rate.	Assessed.	Tenanted.	Rate.	Assessed.	Tenanted.
\$			\$			\$		
12 00	43	43	.....	382	382	.....	418	418
17 00	93	93	52 00	13	13	97 00	1	1
22 00	76	76	57 00	6	6	102 00	4	4
27 00	44	44	62 00	3	3	142 00	1	1
32 00	47	47	67 00	1	1	152 00	2	2
37 00	21	21	72 00	7	7	162 00	1	1
42 00	47	47	77 00	2	2	452 00	1	1
47 00	11	11	82 00	4	4	.....	.....	.....
	382	382		418	418		428	428

RECAPITULATION :

	Tenanted.	Vacant.	Total.
Dwellings.....	43697	2106	45803
Stores, shops, offices &c.....	8010	908	8918
Hotels, Taverns &c.....	428	.....	428
	52135	3014	55149
Steam Engines.....			94
Special charges for manufactories &c			176
Horse stalls.....			858
Water closets.....			4961
Urinals.....			1249
Horses.....			6993
Cows			900

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